The Foundry

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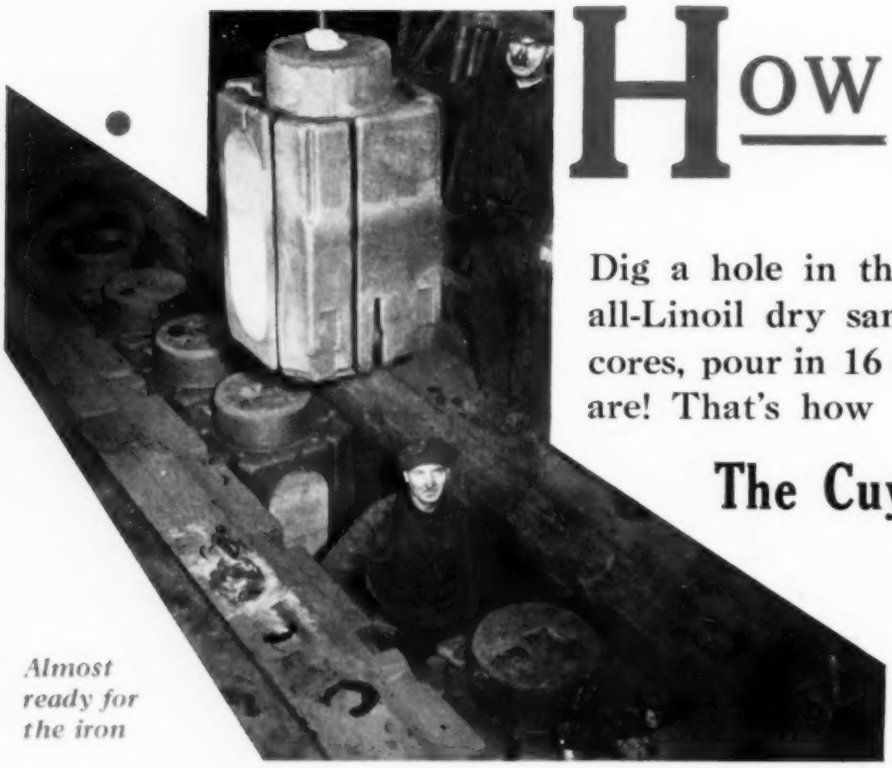

Almost ready for the iron

HOW TO MAKE

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The Cuyahoga Foundry Co.
CLEVELAND
make
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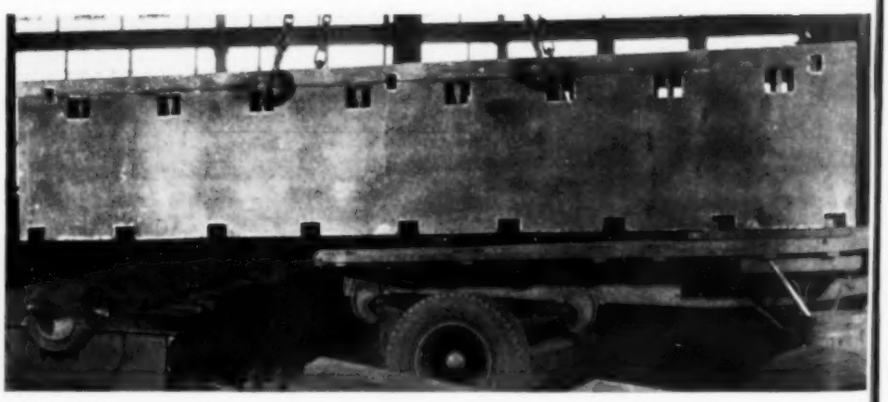
THE LOGICAL OIL FOR CORES

"Marie S. Moran" is the first Diesel-driven vessel of The Moran Towing and Transportation Company's fleet of forty work boats—the largest fleet in America if not in the world. She is used in New York harbor in the berthing and sailing of the "Queen Mary," the "Normandy" and other large ships of the Cunard and French lines. All steel construction, she is powered with a 6-cylinder, 15 inch bore by 22-inch stroke, Winton-Diesel engine developing 550 h.p. This type of engine with same measurement bore and stroke is made by the Winton Engine Corporation, Cleveland, in 3, 4, 6 and 8 cylinders. Castings for these powerful engines must be perfect and foundrymen know perfection is had by using all-Linoil sand.



16-ton 8-cylinder block and waterbox casting for Winton-Diesel engine. Note crankcase for this job on floor at rear of truck.

THE WERNER G.

The Foundry

Greater Stress Needed On Safety Work

A SITUATION demanding attention of all foundrymen is revealed in the recent report of the National Safety council covering accident rates in the foundry industry during 1936. Statistics collected from 120 castings shops, whose employes worked 96,928,000 man hours, show foundries are among the high frequency industries, ranking twenty-fifth in frequency and eighteenth in severity among 30 major industries which were investigated.

As compared with 1935, frequency rates advanced 14 per cent to 28.43 and severity rates rose 31 per cent to 1.64. The average frequency rate for all industry was 13.57 and the average severity rate was 1.64. The report also shows that large foundries had the lowest frequency rates and medium sized plants had the lowest severity rates. The best showing, compared with 1935, was made by medium plants. Record of small shops did not equal 1935.

While the foundry industry has made much progress in safety work during the past decade, much remains to be done. Records of the council present the striking fact that in 10 years the accident severity rate was reduced 75 per cent, which is by far the greatest improvement made by any metal working industry. On the other hand, foundrymen have not been quite as successful in reducing frequency rates.

Results of good housekeeping and accident prevention work depend entirely on effort expended. The program must be originated by and have the unqualified and continued support of management, must be sold completely to the executive staff and all employes, and must be worked at incessantly. Aside from the tremendous importance of the humanitarian angles involved, a successful safety program provides a substantial financial return to the company.

The need for greater effort on the part of management is plain, especially with plants busy and large numbers of men employed.

A.F.A. Selects Cleveland

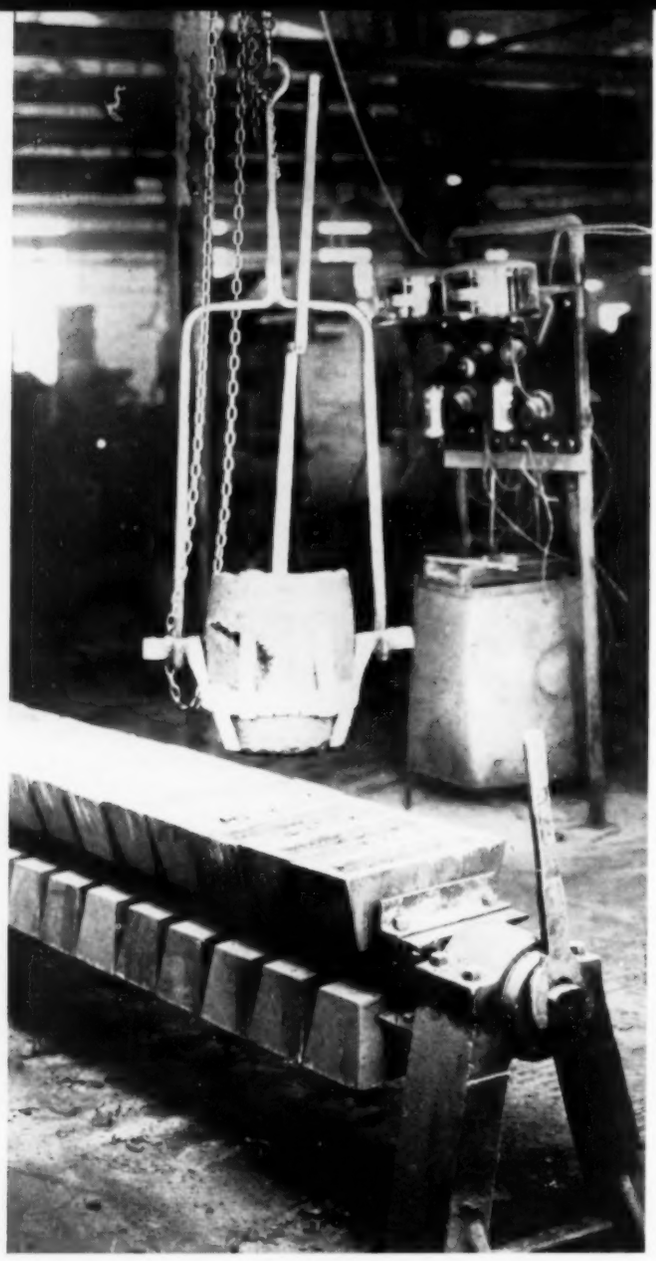
FOR the fifth time during the past 32 years, the American Foundrymen's association selects Cleveland for an annual convention and exhibition. The first meeting on the southern shore of Lake Erie was held in 1906, the second in 1916, the third in 1923 and the fourth in 1930. With all branches of the foundry industry moving forward at a rapid rate, with an ever growing interest on the part of foundrymen in technical and mechanical progress, and with the chapter movement creating greater interest in the association program, predictions of a record breaking attendance at the 1938 convention and exhibition are not overly optimistic.

Cleveland's facilities for handling the foundry convention and exhibition are excellent. Of prime importance is the spacious auditorium and Lakeside exhibition hall situated within walking distance of adequate hotel facilities. The city's 113 foundries offer the groundwork for an instructive plant visitation program. Points of interest abound to provide a delightful vacation for the ladies. Incidentally a few golf courses are scattered throughout the metropolitan area.

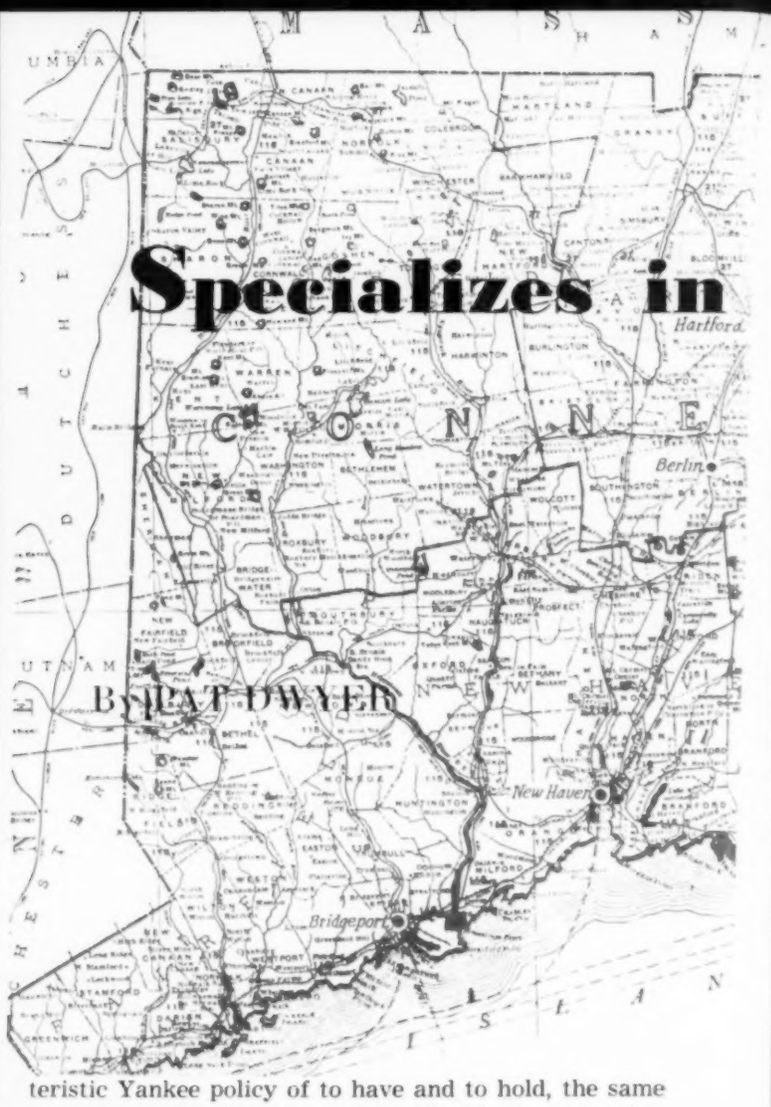
Plans for the serious portion of convention week are well under way. The technical staff of the association has made considerable progress in preparation of the convention program covering many ramifications of practice and management. Developments in all phases of the convention program will be presented in THE FOUNDRY in the coming months.

As one interested in foundry progress, why not follow the suggestion of the artist on page 25, and mark the calendar pad for Cleveland, May 14, 16, 17, 18, and 19, 1938.

Frank G. Steinebach
Editor



Specializes in



CONNECTICUT, one of the original 13 and one of the smallest states in the American Union, assumes an altogether different status when measured by the yardstick of variety and volume of manufactured products. The state ranks eleventh in gross value of manufactured products and is second in the per capita value of these products. Still more significant is the fact that a larger number of patents in proportion to the population has been issued to Connecticut inventors than to those of any other state in the union.

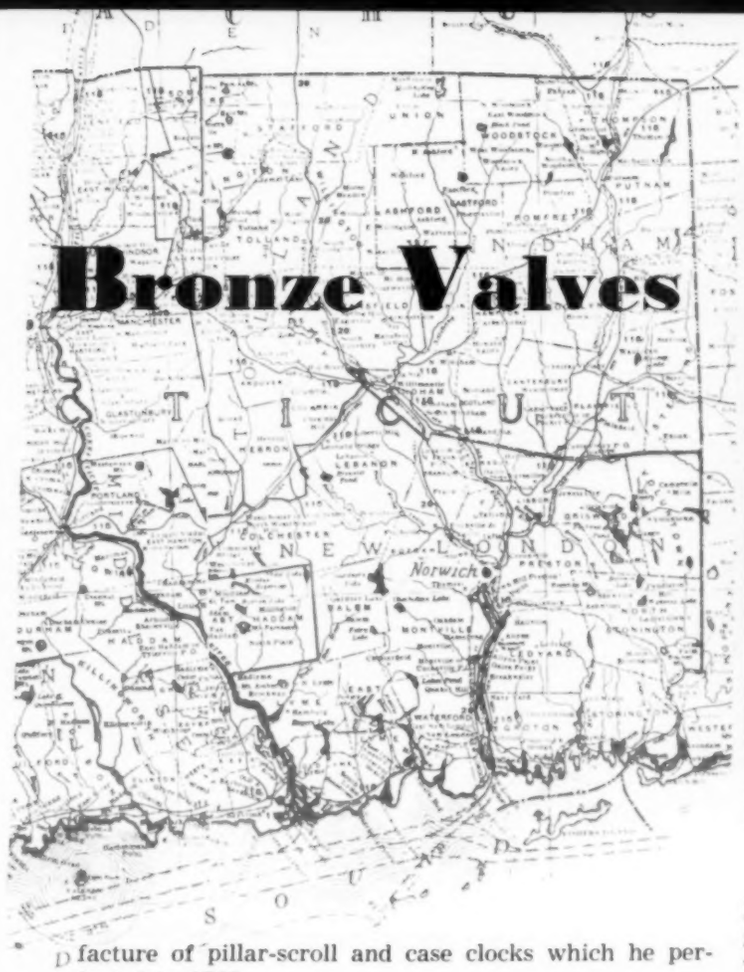
In early colonial days inventive genius was born of necessity, and apparently in harmony with the characteristic Yankee policy of to have and to hold, the same inventive genius has been transmitted from generation to generaton down to the present. The first settlers brought with them intelligence, broad and liberal views on government, civil and ecclesiastical, and little or nothing more. The men were not industrial specialists, but they had open minds, and what perhaps is more important, they were right handy with their hands. The leading townsmen were farmers with a growing tendency to trade. Each one of them was quite competent to deal with any industrial or political emergency that might arise.

Diaries covering the first half of the 18th century, in many instances show that the diarist was a ship carpenter, house carpenter, blacksmith, millwright, surveyor, judge of probate, soldier and deputy to the general assembly while pursuing his regular occupation of a trading farmer. His neighbors were equally versatile in their industrial and political pursuits. This diversity of individual talents naturally grew in time to specializing as the needs and resources of the commonwealth developed.

In 1768 the first paper mill in Connecticut, if not in the country, successfully was established at Norwich by Charles Leffingwell. Tin ware first was made in Berlin in 1770 and furnished for a century or more an important industry in which the Yankee peddler exercised his wit and shrewdness. In 1773 Thomas Harland from London established at Norwich a shop for making and repairing watches and clocks. In this shop Eli Terry learned the mechanisms of the clocks of the day and afterward applied his inventive genius to the manu-

Fig. 1 (Above) Left over metal is spilled into a reversible battery of ingot molds

Fig. 2 (Left) Molds are made in solid metal flasks to prevent strains and distortion



Bronze Valves

facture of pillar-scroll and case clocks which he perfected in 1793.

Other Connecticut inventors, especially Seth Thomas and Chauncy Jerome, brought clock making to or very near to its present perfection. Eli Whitney, inventor of the cotton gin though not a Connecticut man by birth, owed his fortune to the successful manufacture of fire arms at New Haven in 1798 after losing the fruit of his great invention in the South in 1792.

The first manufacture of sewing machines on an extended scale was established by Elias Howe at Bridgeport, followed in the same city by improvements by Wheeler and Wilson. In 1844 Charles Goodyear of New Haven obtained his first patent for the process of vulcanizing rubber, a process which revolutionized the entire industry. Invention of the electro-silver plating process is credited to the Rogers Brothers, Hartford in 1846.

As early as 1749 John Allyn had experimented in brass making. Seed dropped in these early and crude experiments fell on fertile soil and through the years has grown into a mighty tree with ramifications extending into every phase of nonferrous metal application. Continuing the same simile the main trunk of the tree is in the Naugatuck valley where it is claimed a wider variety and larger volume of brass and bronze is rolled, cast, and stamped than in any other similar area in the United States.

Among the more prominent Connecticut nonferrous foundries is that of Jenkins Bros., Bridgeport, which for over 70 years has specialized in the production of valves. The foundry with a potential melting capacity of approximately 35 tons per day forms part of an extensive group of buildings covering an entire city block where valves in almost infinite variety are designed, manufactured and shipped. One side of the square is bounded by the main line of the New York, New Haven & Hartford railroad thereby facilitating reception of incoming raw materials and shipment of outgoing finished product. In recent years this service has been supplemented to a considerable extent by motor trucks.

Naturally over a period of many years interesting methods and ingenious types of machines have been de-

Fig. 3—Dried and assembled cores packed in small wooden boxes are loaded on racks for transportation from one room to another

Fig. 4—Men engaged in pouring metal wear special shoes, aprons, leggings and goggles. The crucible is supported in an unusually safe type bail with close fitting members above and below the shank circle. Close and accurate control is secured through the long lever

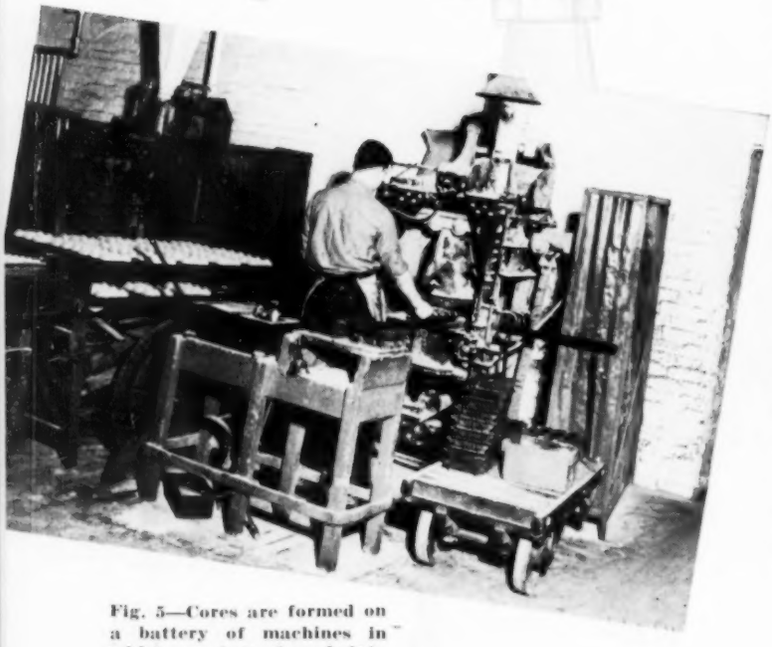


Fig. 5—Cores are formed on a battery of machines in which sand is forced into the corebox with compressed air

Fig. 6 (Above) Cores are dried in a battery of drawer type ovens with a firing chamber located between each pair. Fig. 7 (Below) Cores are inspected, tested and assembled in a large, well lighted room set set apart for the purpose

veloped for finishing the castings in the machine and assembly departments. In speed of operation, ingenuity of movement and high degree of accuracy these machines reflect the essence of Yankee shrewdness and mechanical genius over a period of many years. Further or detailed reference to this section of the plant, interesting though it might be, lies outside the scope of the present discussion dealing exclusively with some of the materials, methods and equipment in the foundry.

Floor space in the foundry, 150 x 180 feet, or a total of 27,000 square feet is divided by six longitudinal aisles or gangways, all leading to a transverse gangway at one end. The melting furnaces are located on the opposite side of this gangway and the molten metal is distributed by a monorail system extending over each of the longitudinal gangways. Floors between the west wall of the building and the nearest gangway are devoted to the production of odd and miscellaneous castings, molded by hand as in ordinary jobbing foundry practice. All the other floors are equipped with molding machines designed for mass production of duplicate valve parts.

Metal Is Poured Continuously

Metal is poured continuously throughout the day, therefore a comparatively small space in the vicinity of each molding machine is sufficient to accommodate the molds made over any given period. Each batch of molds is shaken out almost immediately after the metal has solidified. The castings are picked up by tongs and dipped into a water barrel. The generated steam blows the cores out of them, while the temperature at which they are dipped, to a certain extent decides the surface color.

A special pouring gang, expert through long practice, brings the metal from the furnaces and pours it into the molds. Each molder is assisted by a helper who places the molds on the floor, shifts the weights, keeps a supply of flasks, cores and bottom boards on hand, and cuts over the sand. With this division of duties it is claimed that an output of approximately 3000 pounds of castings per day is secured from each floor. The average daily production of the shop is 25 tons, but in periods of extreme activity a daily peak production of 37 tons has been attained.

Practically all the metal is melted in a battery of 10 electric furnaces supplied by the Detroit Electric Furnace Co., Detroit. Two of these furnaces have a capacity of 1500 pounds per charge, four hold 1000 pounds each and four smaller furnaces take a charge of 350 pounds each. With this arrangement and with an approximate melting period of one hour per heat a wide variety of different mixtures may be poured in a day. Conversely, if necessary, the same type of metal may be melted at one time in a number of, or in all the furnaces. Over an extended period it is claimed the electric current consumed amounts to 145 kilowatts per 1100 pounds of metal melted.

Since this is a valve specialty plant, the greater part of the metal conforms to the analysis and shows the physical properties indicated in the accompanying table. Metal for valve bodies contains copper 87.50 per cent, tin 4.50 per cent, lead 2.75 per cent and zinc 5.25 per cent. This metal shows a tensile strength of 35,000 pounds per square inch, a (*Please turn to page* 66)

MEMO
A. F. A. Convention

Cleveland
May 14,16,17,18,19,1938

A. F. A. Selects Cleveland for 1938 Convention

THE 1938 annual convention and exhibition of the American Foundrymen's association will be held in Cleveland, May, 14, 16, 17, 18 and 19, according to a recent announcement of Executive Vice President C. E. Hoyt. Decision to hold the next convention on the shores of Lake Erie was made in Chicago, July 20, at the annual meeting of the board of directors.

The coming convention and exhibition promises to be one of the largest in the history of the association. Central location of the convention city assures a large attendance. Exceptional facilities for the show and technical meetings should prove attractive to manufacturers of equipment and supplies as well as to all foundrymen, from the president to the apprentice.

Since the last previous convention and exhibition of the A. F. A. held in Cleveland in 1930, facilities for handling such meetings have been enlarged greatly. Exhibit of equipment and supplies will occupy the splendid facilities of the public auditorium and the new Lakeside underground exhibition hall. Technical sessions will be held in the spacious meeting rooms of the public auditorium.

The exhibit will open on Saturday, May 14, for the benefit of foundrymen in Cleveland and the surrounding territory. This feature will permit all foundry workers to learn at first hand of new developments of the industry. Technical sessions will open Monday morning, May 16 and will continue to Thursday, May 19.

Cleveland, one of the ranking foundry centers of the United States, offers many and varied attractions to the convention visitor. Foundrymen will be interested in the plant visitation program which will include shops making a wide variety of work. The ladies will enjoy the shopping center, theater district and the many interesting show places in the city and surrounding territory.

This is the third consecutive year that an A. F. A. chapter has assisted in preparing convention plans. In Cleveland, the Northeastern Ohio Chapter of the A.F.A. will assist in welcoming foundrymen to the convention city. Officers include Bertram G. Parker, Youngstown Foundry & Machine Co., Youngstown, O., chairman; L. P. Robinson, Werner G. Smith Co., Cleveland; vice chairman; J. H. Tressler, Hickman-Williams & Co., Cleveland, secretary; and R. F. Lincoln, Osborn Mfg. Co,. Cleveland treasurer.

REFINING IRON IN

By

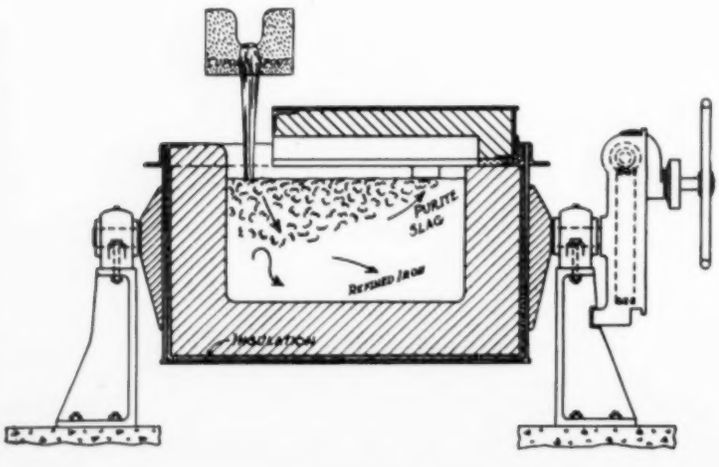
GEORGE S. EVANS

This article is from a paper presented before the St. Louis District Chapter of the A.F.A. The author is metallurgist with the Mathieson Alkali Works, New York

THE peculiar value of soda ash as a refining agent for cupola cast iron is due to its power to form liquid soda slags at cupola melting temperatures and to the rapidity of the reactions within the slag at these temperatures.

Such difficult castings as radiator sections and bath tubs with 3/16-inch metal thicknesses, and such important castings as diesel engine cylinders, regularly are being made from 100 per cent scrap and ferro-silicon-manganese alloy mixtures.

Use of 100 per cent scrap mixtures throughout the foundry industry would be impossible even though it were commercially practical, which it is not. However, this serves to illustrate the refining action of soda slags upon molten cast iron at cupola temperature. Again, this would seem to be sufficient evidence of the practical value of the refining as applied to any and all types of castings irrespective of any possible saving in mixture costs.



Speed of the refining reactions is shown in the following analysis:

Before Treatment Per cent		Desulphurized and recarbonized Per cent
0.168	Sulphur	0.53
1.00	Combined Carbon	0.38
3.01	Total Carbon	3.46
2.01	Graphite	3.08
3.10	Silicon	2.97
0.35	Manganese	0.29
0.62	Phosphorus	0.63

The sulphur content in the metal at the spout was reduced from 0.168 to 0.053 per cent within 2 minutes. The time required for the reactions in ordinary equipment, will average longer, varying from a minimum of 12 minutes in 1-ton to upwards of 30 minutes in 10-ton open ladles. In the new elongated teapot mixer ladles, Figs. 1 and 2, which offer a relatively larger surface area and where the slag is kept hot by the cover, a minimum elapsed time of 4 to 5 minutes has been found satisfactory with smaller melting rates.

Value of soda ash in the cupola charge results more from its effect upon the combustion reactions and upon melting conditions than from actual sulphur reduction. Small quantities of fused soda ash, 2 to 4 pounds per ton of metal charge, added in the cupola with the limestone, usually will exert a noticeable influence upon the fluidity of the slag and improve cupola melting conditions generally. As little as 1 pound per ton, acting as a catalyst, oftentimes will effect a noticeable reduction

Fig. 3—Sectional view of stationary reservoir ladle under the cupola spout. The ladle is heavily insulated and provided with a cover to conserve the heat

MIXING LADLES

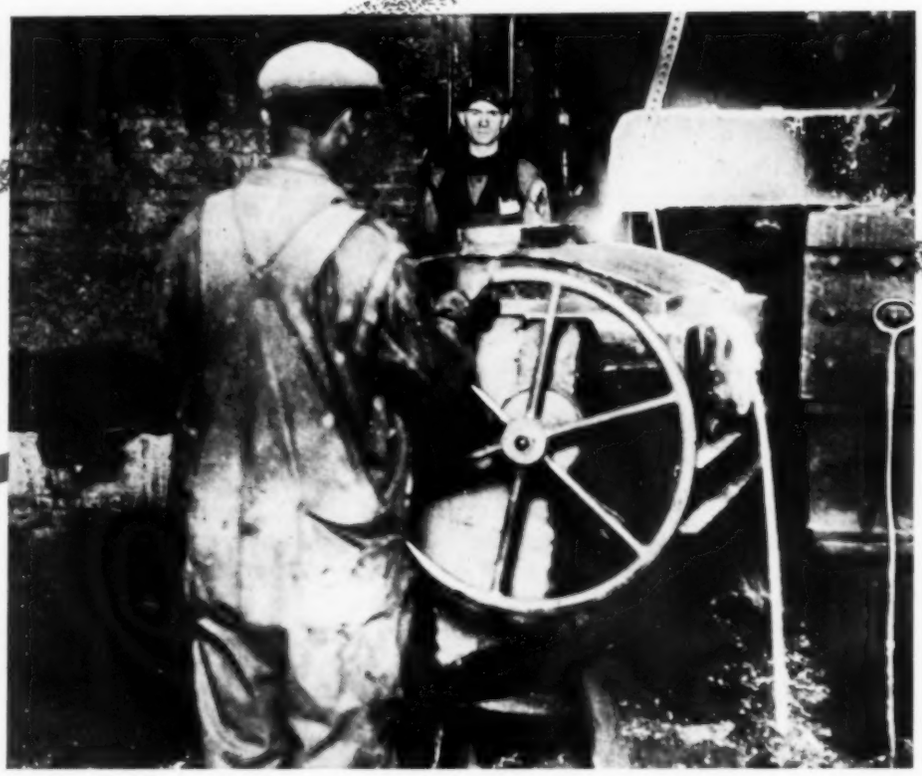


Fig. 1 (Left) U-shaped elongated teapot mixer ladle with ball bearing gear drive. Spout view showing continuous flow of iron from the cupola spout as the transfer ladle is being filled. Fig. 2 (Right) End view, pouring slag from the ladle

in oxidation of the metal, as seen by an improvement in fluidity of the iron and in the machinability of the finished castings.

Effect of sodium carbonate in accelerating the rate of the combustion reactions, and thereby reducing the area of the oxidizing zones in the cupola is illustrated in the diagram Fig. 5. This action does not necessarily cause faster melting, which is controlled largely by blast input, but by speeding up the union of the oxygen in the blast and the carbon in the coke, has the effect of restricting combustion to a smaller, hotter zone at the tuyeres and to that extent increases the nonoxidizing or reducing zone. Small quantities keep the tuyeres brighter during long heats and reduce the tendency to bridging.

With average foundry mixtures, 2 to 4 pounds of soda ash per ton of metal, added with the regular limestone charge, usually will reduce the sulphur by 1 to 1½ points or from 0.11 to 0.095 per cent. Equal quantities used on all-scrap, high-sulphur mixtures generally will show upward of 2½ to 3 points reduction or from 0.17 to 0.14 per cent sulphur. Under extremely favorable conditions, greater reductions in sulphur can and regularly are being made in the cupola with the use of 8 to 12 pounds per ton. Owing to the diluting effect of the normal cupola slags, the results, even with the larger quantities, will be erratic and there always is the danger of foaming which sometimes occurs with an excess volume of extremely fluid slag which usually is formed.

Practical usage has established the economic value of soda ash in the cupola as a means of improving combustion, and also for fluxing entrained oxide-silicate inclusions which often show up as hard spots in light-section castings poured from high-scrap mixtures. Uniform desulphurization within specified limits best can be accomplished by refining the metal from the cupola in a teapot mixer ladle or forehearth equipment. Variations in composition between different parts of the heat generally are levelled out by the combined influence of the better mixture resulting in the refining reservoir coupled with the effects of the refining. That in itself is well worth while.

Another important factor in holding back the general adoption of this refining process at foundries producing light weight castings, has been the relatively large volume of metal, in relation (*Please turn to page* 72)

CAPACITY POUNDS	A	B	C	D	E	F	G	H	J	K	LINING THICKNESS
1000	28	42	9½	13	5/16	3/8	40	22	22½	3	7½
1750	30¾	48	12	14½	5/16	½	47½	26½	24½	4½	7½
2500	31¾	56	12½	15	5/16	½	51	29	25	4½	7½
3500	40	60	15½	18	3/8	½	59½	33	31	4½	7½
5000	45	60	15½	20½	3/8	½	64¾	36	32½	4½	10
7500	45	76	17½	20½	½	½	67	37	33½	4½	10

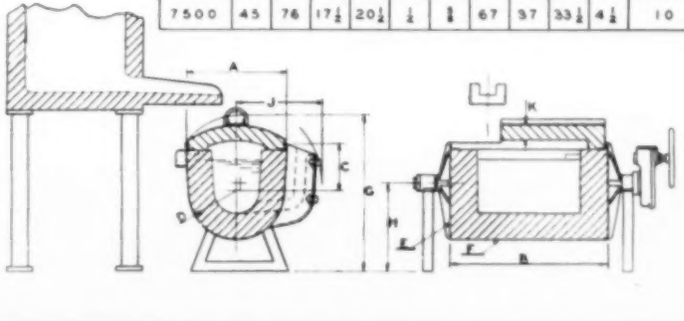


Fig. 4—Table showing various dimensions and lining thickness for mixer ladles varying in capacity from 1000 to 7500 pounds

Rethinking DEPRECIATION and OBSOLESCENCE

By PAUL T. NORTON JR.
Virginia Polytechnic Institute

THE title of this article, "Rethinking Depreciation and Obsolescence," is ponderous, but I have been unable to find one which better expresses what I wish to discuss. It has been my experience that very few persons either in industry or on college faculties are willing to do much solid thinking about new problems unless they are convinced that such thinking is absolutely essential. Certainly there are few problems which more definitely deserve clear thinking than does the depreciation problem.

The problem of depreciation and obsolescence has been left almost entirely in the hands of accountants instead of being recognized as a management problem which requires attention of general management and also of the engineering department if it is to be solved satisfactorily. The average business man thinks of depreciation and obsolescence as technical problems. Technical specialists can be used in solving certain problems, but management must learn to co-ordinate the activities of all the specialists for the general good of a business.

There are two important new factors which vitally affect the depreciation problem. The first of these is recent legislation, particularly the corporation surplus tax which makes it necessary to calculate depreciation and obsolescence more carefully than ever before if our corporations are to be maintained economically sound and if funds which should be used for replacements are not to be paid out in taxes or unwisely distributed as dividends. Under the present law, if a corporation does not make large enough charges for depreciation and obsolescence, it must either pay dividends out of capital or else pay both the normal corporation tax and the corporation surplus tax of 7 to 27 per cent on book profits which are not real profits at all. In extreme cases this may mean that a corporation will have to pay in taxes to the federal government alone nearly 38 per cent of these apparent but also unreal profits.

The second factor is the constant rise in standards of perfection of products and service, which in turn places greater demands upon plant and equipment. Formerly, sales did not depend so much upon minor superiorities in quality or slight savings in cost. Under such conditions it often was possible to use machinery and other equipment which was not really adequate, but today the competition is keen and the margin between success and failure is narrow. If a manufacturing concern is to be successful it must have adequate equipment. It must also have a knowledge of true costs so that it will be able to determine when equipment is obsolete. It must also have funds available for replacing obsolete equipment. None of these things is possible unless depreciation and obsolescence are handled properly.

It is not possible to set standard depreciation rates, nor, in fact, to prescribe in detail a standard system for calculating depreciation charges for a group of manufacturers whose plants are operating under different conditions. Let me emphasize the fact that I am not advocating standard depreciation rates. Standard depreciation rates are not practicable; an attempt to standardize these rates, whether up or down, would not promote accuracy or a knowledge of the true facts and it certainly would tend toward rigidity instead of the flexibility which is so desirable and so necessary.

There are, however, several fundamental principles upon which all sound depreciation reserve policies must be based. A committee of the Machinery & Allied Products institute recently has completed a long study and analysis, resulting in the formulation of three fundamental policies which apply in all circumstances. These policies are important, and the more they are studied, tested and applied, the more surely they are found by industrial managers to com- (*Please turn to page* 77)

Demands Greater

MANAGEMENT must give greater attention to the solution of the problem of depreciation and obsolescence. As Professor Norton points out, two factors require consideration, namely legislation, particularly the corporation surplus tax, and the constant rise in standards of perfection of products and services resulting in greater demands upon plant and equipment.

This thought provoking article, prepared by an authority in the field of industrial engineering, is from a paper presented at the recent annual meeting of the Gray Iron Founder's society held in Cleveland. The author is professor of Industrial Engineering at Virginia Polytechnic Institute, Blacksburg, Va.

Hints on Brass Shop Practice

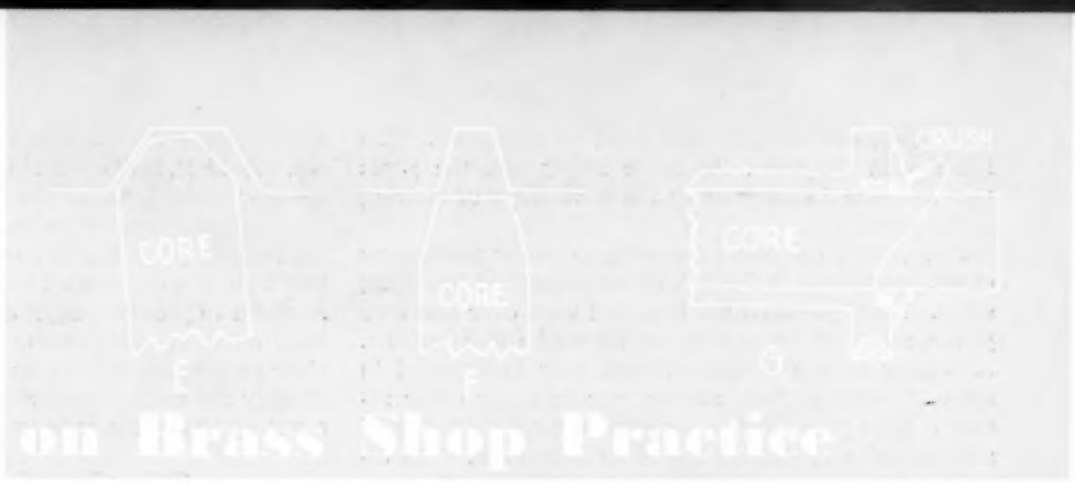


Fig. 1, Left—Mold print too large, core off center. Center—Mold print too small, will crush when cope is closed. Right—Sand from crushed print falls into mold

By N. K. B. PATCH

PRODUCTION of nonferrous castings involves three primary steps: Melting the necessary metal, making the necessary molds into which the metal is to be poured, shaking out the molds and cleaning and snagging the castings, thus completing the castings ready for use. In the July issue of THE FOUNDRY, we discussed operation and maintenance of different types of furnaces used for melting nonferrous metals. If these furnaces are operated properly, good metal should result when satisfactory materials are charged therein.

The next step, making molds, is in many respects and with a few exceptions, similar to that of making molds for gray iron or other metal. The grade of sand should be somewhat finer than that commonly used in a gray iron foundry, unless the castings are very large or of heavy sections. This finer sand is desirable for the reason that it produces a better finish on the casting. Since nonferrous castings commonly are used without machining all the surfaces, this finish is essential in many instances. The sand should be free venting and have only just enough bond to insure successful operation as a molding sand. Too much bond reduces the venting capacity and confines gases that cause blow holes in the castings. These gases necessarily must have free opportunity to pass out of the mold as they develop during the casting process.

Where relatively heavy sections are part of the castings the mass of heat to be dissipated during solidification is such that the temperature of the sand in the vicinity may be raised to an abnormal level with resulting combustion of any combustible material in the sand, and development of an excessive amount of gases to be dissipated. Consequently, on heavy section castings, it is desirable to surface the pattern with fine sand and back this up with coarser sand so that the extra gases produced by higher temperature may have easy exit from the mold, thus preventing blow holes in the castings. However, abnormally heated sands will develop scabs unless proper precautions are taken. One helpful step is the use of coarser sand. Another is to surface the mold rather carefully with a noncombustible material, such as graphite or silica. See that a particular part of the mold is extra well vented. In some instances it even becomes necessary to chill a particular point or points in the casting by setting suitable chills in the mold.

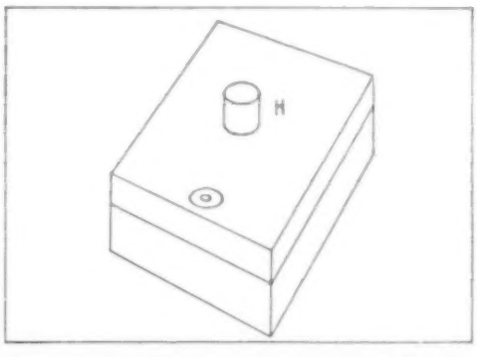


Fig. 2—Riser cup H on cope increases effective height and pressure

To insure the production of sound, clean nonferrous castings, the gating system varies to some degree from that generally practiced in the preparation of molds for other metals. In gray iron castings, a few specks of sand loosely distributed in the molds may be washed along with the metal and finally become dissolved. Loose sand particles in the mold form imperfections in nonferrous castings. Sand specks caught in the flowing metal definitely form defects objectionable from many standpoints. In the jobbing foundry where castings are sold in the rough, they become a source of rejection, and consequently increase the cost for saleable castings. Furthermore, even if the castings are accepted, sand spots may damage the tools when machining the castings and thus increase the cost of machining, not to mention the all too frequent experience of defective machining resulting from this cause.

In the production of molds into which nonferrous metals are to be poured, the molder must be far more particular about the minor details than with molds for other metals. The molds must be exceptionally clean; with no parts likely to wash loose by the entering stream of metal. The mold must be well finished if the surface of the casting is to have the high order finish expected for nonferrous metal. Gates must be so arranged that the entering metal can do no damage. Agitation of nonferrous metals during pouring is objectionable from many standpoints. Gates must be designed to insure absence of agitation of any kind.

Pouring temperature of nonferrous metals usually is lower than that common to iron or steel. The temperature effect upon the materials of the mold and cores is not as intense. Therefore, bonding materials for cores and mold washes are available that would not be satisfactory for molds into which metals would be poured at higher temperature. A number of excellent core binders are available for binding sand cores used in the nonferrous foundry. The less

bond used, the less gas that must be dissipated. The more open the sand, the more freely will the gases pass away, and consequently the less danger of blowing of the cores.

One common source of trouble to many nonferrous casting producers is the lack of care exercised in setting cores. Many patterns are provided with over size core prints, allowing the core to move from its true position. A casting with a misplaced core, may be rejected in spite of being entirely satisfactory in every other respect. Core prints for nonferrous castings should be of adequate size to support the cores accurately. The diameter of the core print should be such that the core will fit it correctly and not crush the sand when the core is in its print and the mold is closed. This is a common form of defect, loose sand in the mold, the result of placing an over size core in an under size core print in the mold. This loose sand is washed into different parts of the mold resulting in cavities sometimes thought to be caused by blows or erosion of the metal.

Trace Trouble To Sprue

Another source of trouble may be traced to the sprue. In some instances the first metal entering the sprue tears some sand loose or washes some loose dust down into the mold. This loose dirt lodges in places where it causes a defect and consequent rejection of the casting. The gate should be arranged so that the first metal is directed to a blind end of the runner and after the runner is filled, the metal flows into the mold. This is an excellent precauton in many instances. Fig. 3 illustrates one application of a type of gate capable of wide variation. Pouring sprue is at *A*, blind sprue at *B*.

Another important factor in the production of molds for nonferrous castings is the provision of ample risers at proper location to insure adequate feeding of the castings. Most of the nonferrous metals require feeding and some of them require a great deal of feeding. Risers are essential to the production of sound castings. The heavier sections of a casting supply metal to feed the lighter sections. These heavier sections must be fed, therefore, risers must be provided to feed them. The opening through which the riser feeds the section must be designed properly so that it will not freeze before the necessary feeding is completed. A frozen neck acts like a valve and shuts off the feeding that the riser was intended to provide height and pressure of metal in the riser must be sufficient to cause metal to flow from riser to casting as long as the casting needs feeding. Usually the extra height required is secured by placing a cup on top of the cope as shown in Fig. 2.

Gating Presents Ramifications

The subject of gating nonferrous castings presents almost endless ramifications, since there are so many different alloys and each has its peculiar characteristics. Gating is an essential part of the production of molds and must be well planned in advance before molding is attempted. Molds for nonferrous metals are not rammed as hard as for ferrous metals; but they must be rammed hard enough to withstand the weight of the metal.

Since nonferrous metals are expensive, the castings should be as true as possible to pattern so that excess metal in a given casting is avoided. Amount of finish allowed on a casting frequently is reduced on this account. In fact, sometimes the amount of finish allowance is disastrously low, resulting in an increase in the cost of casting because of rejections that would not be necessary were the finish allowance just a little more liberal. In view of the demand for accuracy to pattern, it is essential that the mold shall be rammed most carefully. Where the molds are large and subjected to rather heavy pressures, from large amounts of metal in the mold and risers, the mold should be rammed somewhat harder at the bottom than at the top.

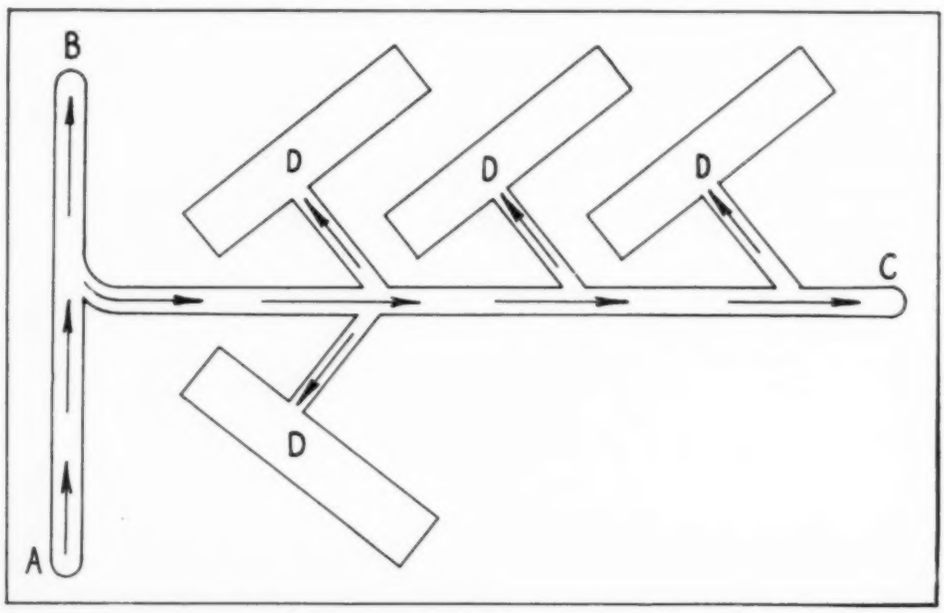
Every precaution should be taken to see that the wall thickness demanded by the patterns is maintained uniformly throughout the mold. In many instances it becomes necessary to test this wall thickness carefully by closing the mold over balls of dough or clay located at several points and then opening the mold again and measuring the wall thickness by the thickness of dough as it has been pressed down by the mating of the parts of the mold.

On castings of relatively large area and thin walls, this practice of closing the mold temporarily with some such measuring medium as the dough balls described is absolutely necessary to be sure that one part of the mold is not shut off and the other part, consequently, excessively thick.

Extra heavy cores may sag and throw wall thickness out of true. Flask pins may be loose, or of inadequate strength to insure perfect

(*Please turn to page* 68)

Fig. 3—Metal from sprue enters runner at A and carries any loose foreign material to blind riser at B. Clean metal flows in direction of arrows to C and to mold cavities D



March 6, 1836

Cards

Dixie Odyssey

Absent Minded

Horses

Molding Was An Art 100 Years Ago

This Indenture WITNESSETH,

THAT

by and with the consent of his Father

hath put himself, and by these presents doth voluntarily, and of his own free will and accord, put himself apprentice

to learn the art, trade, and mystery of

and after the manner of an Apprentice to serve the said

for and during, and to the full end and term of

During all which time the said Apprentice doth covenant and promise, that he will serve his master faithfully, keep his secrets, and obey his lawful commands; that he will do him no damage himself, nor see it done by others, without giving him notice thereof—that he will not waste his goods, nor lend them unlawfully—that he will not contract matrimony within the said term—that he will not play at cards, dice, or any other unlawful game, whereby his master may be injured—that he will neither buy nor sell, with his own goods nor the goods of others, without his master's leave—that he will not absent himself day nor night from his master's service, without his leave—nor haunt ale-houses, taverns or play-houses, but in all things behave himself as a faithful Apprentice ought to do, during the said term. And the said master on his part doth covenant and promise, that he will use the utmost of his endeavours to teach, or cause to be taught or instructed, the said Apprentice in the art, trade or mystery of

and will procure and provide for him sufficient meat, drink, [illegible], lodging, [illegible], fitting for an apprentice, during the said term, and will give him [illegible] said term.

And for the true performance of all and singular the covenants and agreements aforesaid, the said parties bind themselves each unto the other, firmly by these presents. IN WITNESS whereof, the said parties have interchangably set their hands and seals hereunto. Dated the [illegible] day of [illegible]

in the year of our Lord one thousand eight hundred and thirty-[illegible].

Sealed and delivered before me this [illegible]

Alderman

Archibald H. Maxwell

James H. Maxwell

THROUGH the courtesy of relatives we are privileged to present a facsimile of the Indenture signed 101 years ago by a boy who later became a master molder, a pioneer in many improved phases of foundry practice and a prominent citizen engaged in many of the public activities of his adopted town. Biographical material is taken from an obituary notice in a yellowed copy of the *Altoona Times*, Dec. 9, 1897, Altoona, Pa., where Archie Maxwell served as general foundry foreman in the shops of the Pennsylvania railroad for a period of 40 years, from 1850 to 1890.

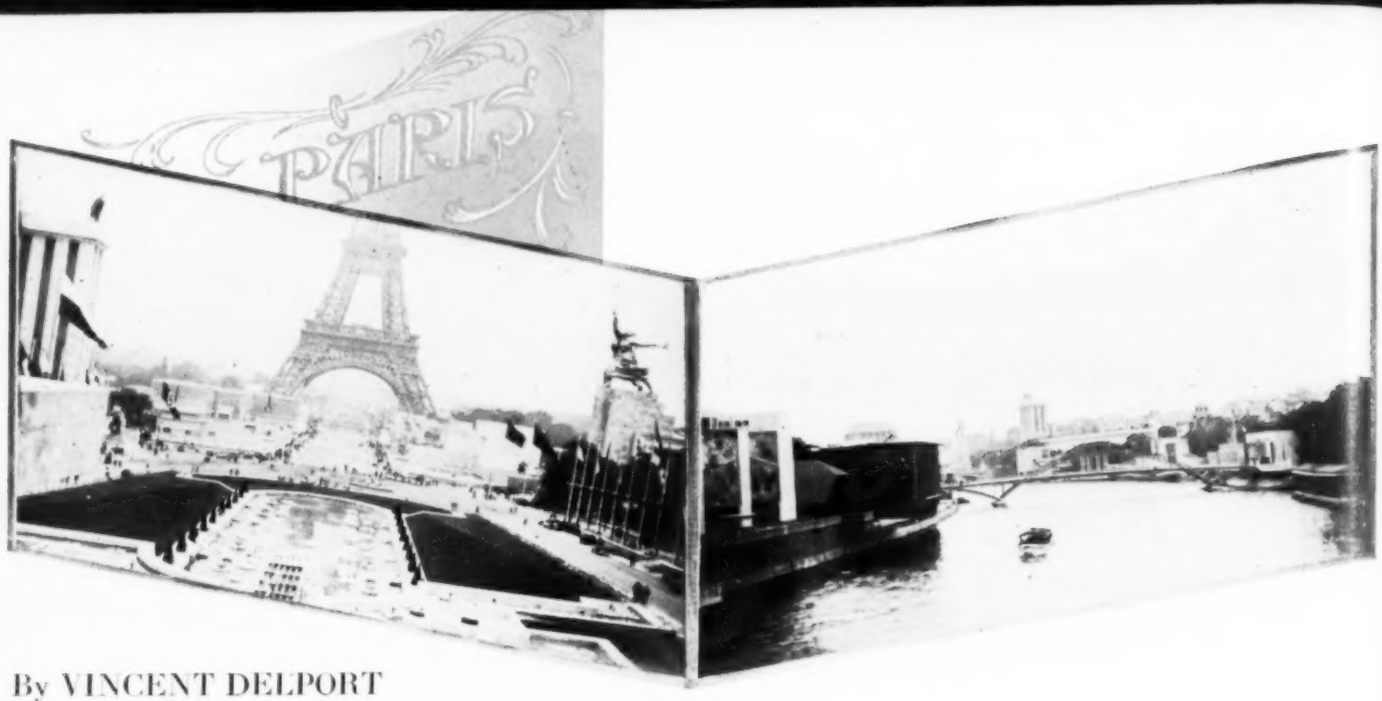
Through the roving habits of molders aided and abetted by the ubiquitous grapevine telegraph, Archie's name, habits and mannerisms, methods of dealing with delicately balanced human relations, and almost uncanny skill in developing methods, special rigging and mixtures for the economical production of castings, had become firmly established in the legend and folklore of the foundry. He was an institution, ageless, changeless. Men might come and men might go, but Archie remained, honored and respected, a great master molder and benevolent autocrat in the foundries of the Pennsylvania railroad, Altoona, Pa.

Present day foundrymen will be interested in the form and terms of the indenture by which Archibald H. Maxwell bound himself to learn the art, trade and mystery of iron molding. No doubt on that far away day March 6, 1836, Archie fully believed in the mystery, but in the course of a long and extremely active career he exploded many of the myths and swept away the greater part of the veil of mystery.

The indenture in approved legal form is signed by Archibald H. Maxwell and James H. Maxwell (the boy's father) as parties of the first part, and Anthony Davis, partner in the firm of Bullock, Davis & Co., party of the second part, all sealed and delivered before Benj. Hutchinson who modestly admits with a grandiloquent flourish of the pen that he is an Alderman.

THIS INDENTURE Witnesseth,

That Archibald Hamilton Maxwell by and with the consent of his Father James H. Maxwell hath put himself, and by these presents doth voluntarily, and of his own free will and accord, put himself apprentice to Anthony Davis to learn the art, trade, and mystery of an Iron Molder, and after the manner of an Apprentice to serve the said Anthony Davis for and during, and to the full end and term of four years and eight months next ensuing. During all which time the said apprentice doth covenant and promise, that he will serve his master faithfully, keep his secrets, and obey his lawful commands; that he will do him no damage himself, nor see it done by others, without giving him notice thereof—that he will not waste his goods, nor lend them unlawfully—(*Please turn to page* 68)



By VINCENT DELPORT

International Foundry

FOUNDRYMEN from seventeen nations were present at the International foundry congress held in Paris June 17 to 24. The congress sessions were held at the Hotel des Anciens Eleves des Arts et Metiers, a stone's throw from the International Exhibition of Arts and Technique which, although unfinished, had already attracted thousands of visitors from all parts of the world.

Among the more notable events of this congress were the planning of the opening session, which contrived to give to the Delegates an almost complete review of the foundry industry in France from every aspect; the presentation of the special gold medal of the Association Technique de Fonderie to J. Leonard, president of the Belgian technical foundry association and immediate past president of the international committee of foundry technical associations; and the formation of a new international committee to classify and define various types of foundry defects.

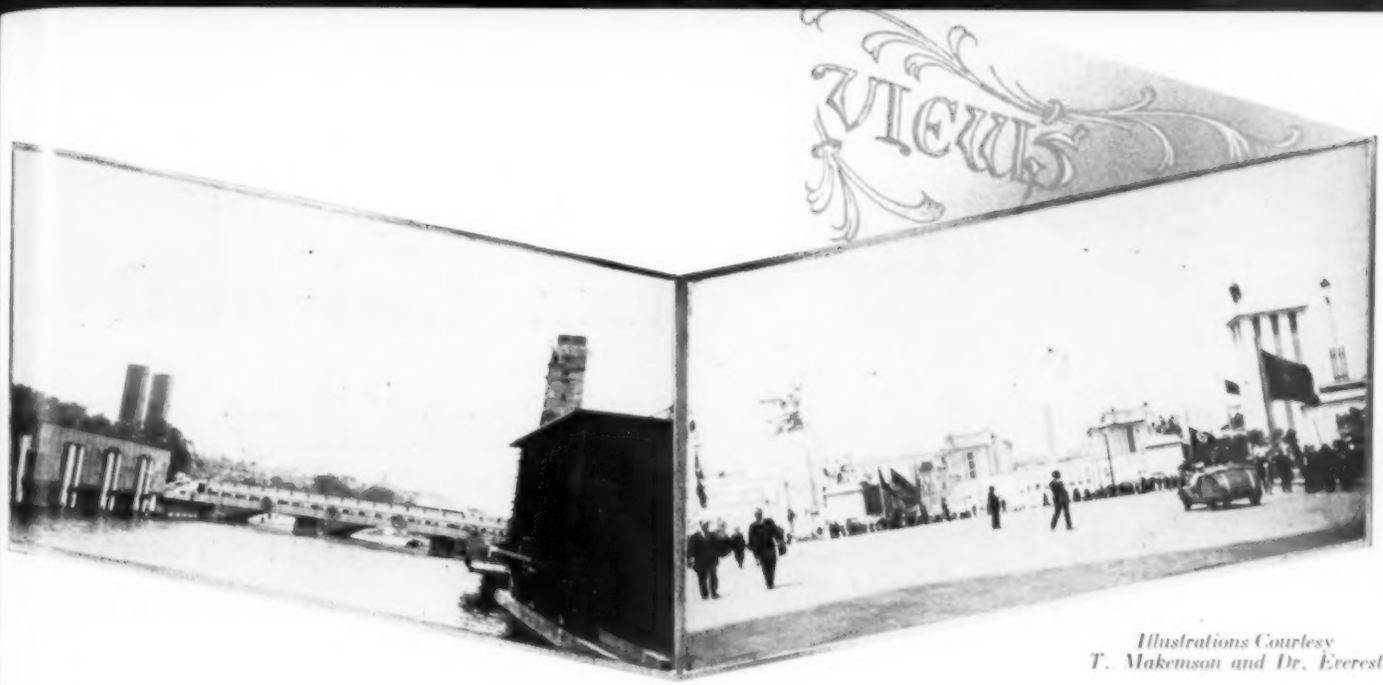
Delegates from various countries, numbering over 600, began to arrive on Thursday, June 17. That evening a reception was given by the committee of the Association Technique de Fonderie. Visitors were received by A. Brizon, president of the association, and Madame Brizon.

The formal opening of the congress took place on the Friday morning, June 18, with M. J. Julien, under-secretary of state for technical education, in the chair. He was supported by A. Brizon, president of the Association Technique de Fonderie, and Vincent Delport, president of the International committee of foundry technical associations. On the platform were also M. Olivier, president of the general syndicate of foundry owners of France, and M. H. Luc, general director of technical education in France.

Above Left—General view looking toward the Eiffel tower, with the Russian pavilion on the right and the German on the left. Above Right — View of the Seine River. Lower Left—Mr. and Mrs. Delport

Summarizes Position of Industry

In his opening address, M. Brizon, managing director, Societe des Fonderies A. Brizon, Courbevoie, Paris, after extending greetings to the visitors on behalf of the French association, gave a brilliant summary of the present position of the foundry industry from the technical and industrial aspect. He mentioned the progress achieved in obtaining better iron castings and reducing production costs, and referred to recent investigations with respect to the phenomenon of graphitization. He mentioned developments in the production of malleable castings, particularly regarding heat treatment. Dealing with steel castings, he referred to the development of nickel-chromium steel castings, and he also mentioned the growing use of special elements added to bronze and brass castings. He reviewed present practice in light foundry castings, especially as regards aluminum and magnesium alloys, and the heat treatment of certain light alloy castings.



Illustrations Courtesy T. Makemson and Dr. Everest

Congress Is Held in Paris

Vincent Delport, managing director Penton Publishing Co. Ltd., London, and European manager of THE FOUNDRY followed as president of the International committee with a short address on behalf of the foreign associations taking part in the congress. After having made a brief reference to the origin of the International committee, and to the dates of previous international foundry congresses, he laid stress on the co-operation that is growing more and more, not only among the various sections of the different national foundry industries, but also internationally, as exemplified by the present and similar congresses.

Reviews French Organization

M. Olivier then gave a review of the general organization of the foundry industry in France, where there are over 1000 foundries employing more than 100,000 men. The French foundry industry now forms a national syndicate of owners, divided into a number of regional syndicates; there is also a division into syndicates each of which is concerned with the main branches or special classes of products manufactured. From the technical point of view the French foundry industry derives its technical heads mainly from the Ecole Superieure de Fonderie; research work is actively pursued at the Institute of Scientific Research of Paris, and at the Centre of Foundry Research at Saulnes. The Association Technique de Fonderie is the technical institute of French foundrymen and operates in a similar fashion to the American Foundrymen's association.

Following a short address by M. J. Julien, the representative of the French government, M. H. Luc, general director of technical education, gave a remarkable address on "Technical Education and the Foundry Industry in France". He stressed the importance of the part played by the leading men in the industry, and of the influence such men have on the younger men by their moral, intellectual and technical qualifications. He emphasized the necessity of starting technical training early, when the child shows signs of interest in all kinds of things, and said that children should be encouraged to use their hands as well as their intellectual faculties. He constructively criticised present methods of training in the works and said that training should be compulsory between the ages of 14 and 17. Foremen also should follow special courses. He stressed the importance of research and laboratory work for engineers and metallurgists. On the whole, technical education should be based on co-operation between the various branches of the industry, from the lowest to the highest ranks, and it should be based on the seeking of what is new, tempered by wise judgment and tradition.

(*Please turn to page* 78)

Above Left — Seine River. Above Right—Looking toward the Trocadero entrance of the exhibit. Lower Right, from left to right, R. Lenoire; P. Bastien; J. Leonard; and R. Meyer

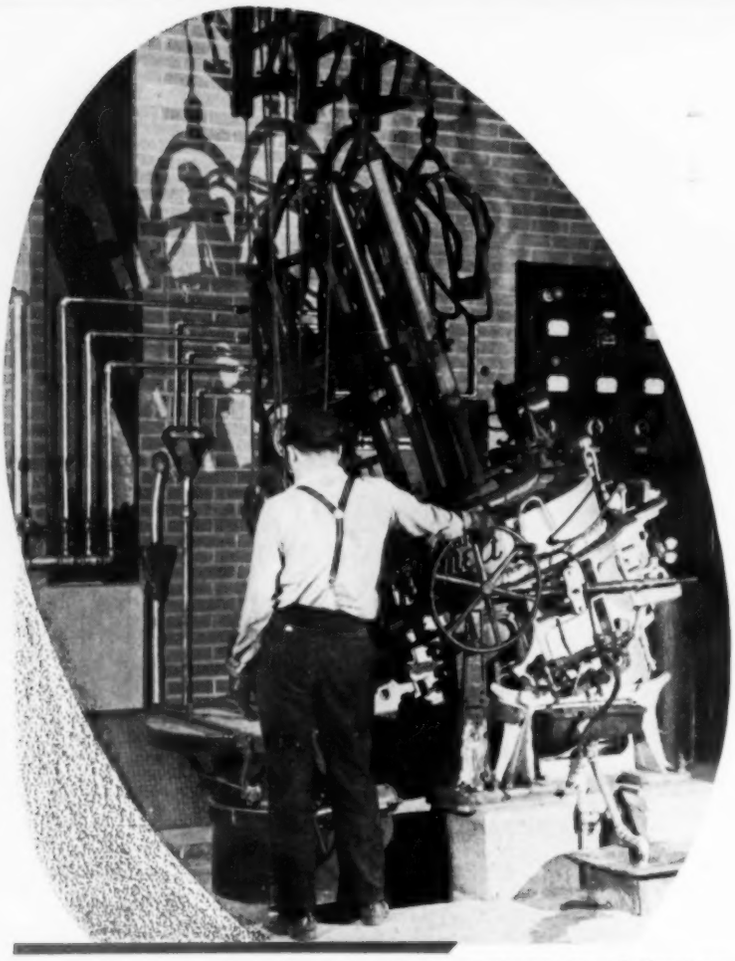


Fig. 1—Pouring a heat from the 500-pound direct arc electric furnace in the new experimental foundry

Opens New Experimental Foundry

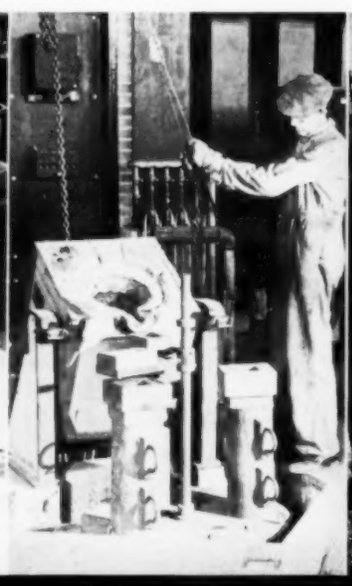
A MILESTONE in foundry progress is marked by the opening of a new experimental foundry by Battelle Memorial institute, Columbus, O. This event brings to the foundry industry equipment for investigating foundry problems on a practical scale of operations. Almost every type of melting unit is available, with molding and sand handling equipment for the production of full sized commercial castings, or experimental ingots, in steel, special alloys, cast iron and nonferrous metals. Metallographic, physical testing and chemical laboratories are equipped to study the properties of finished castings or new alloys developed in the foundry.

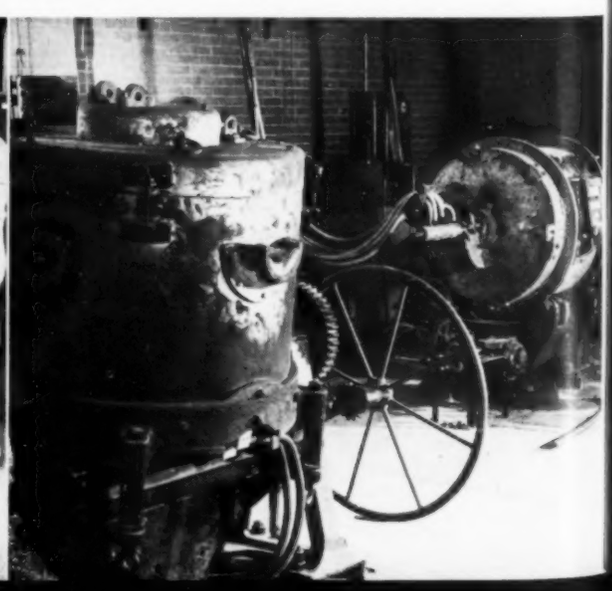
The new foundry and the greatly increased facilities for metallurgical research will permit extension of the institute's technical work for the foundry industry as well as an enlarged program of fundamental scientific investigations. Facilities of the institute are used for the investigation of technical problems of interest to individual foundries or trade associations under the Battelle plan of sponsored research, as well as for the study of fundamental scientific problems which is supported by the institute's endowment.

The new foundry occupies the entire ground floor of the new four story laboratory building, a space approximately 150 feet long and 50 feet wide, with a 24 foot ceiling. A 40 foot, cab controlled, 5 ton crane serves the entire length of the foundry floor. The permanent equipment is installed along both sides of the foundry under the crane as shown in Fig. 5. This arrangement allows ample space for molding and pouring and permits great flexibility in the operation of the different melting units.

As shown in the sketch of the floor plan, Fig. 5, a 10,000 pound platform scale, a 500 pound, 3 phase, direct arc furnace, a 500 pound, high frequency furnace and an 18 inch experimental cupola, provided with special blast controls, are located along one side of the foundry. A 250 kilovolt-ampere transformer and a 100 kilovolt-ampere high frequency set are placed in a vault behind the electric furnaces. Control panels are provided to make this electrical equipment available for (*Please turn to page* 71)

Fig. 2 (Left below)—A corner of the molding floor. Fig. 3 (Center)—High frequency electric furnace has a capacity of 300 pounds. Fig. 4 (Below)—Low frequency furnace at left and 500-pound indirect arc furnace at right





Iron Castings Must Be Perfect

By F. J. FREDRIKSEN

Manufacturing Engineer
Westinghouse Electric & Mfg. Co.,
Cleveland

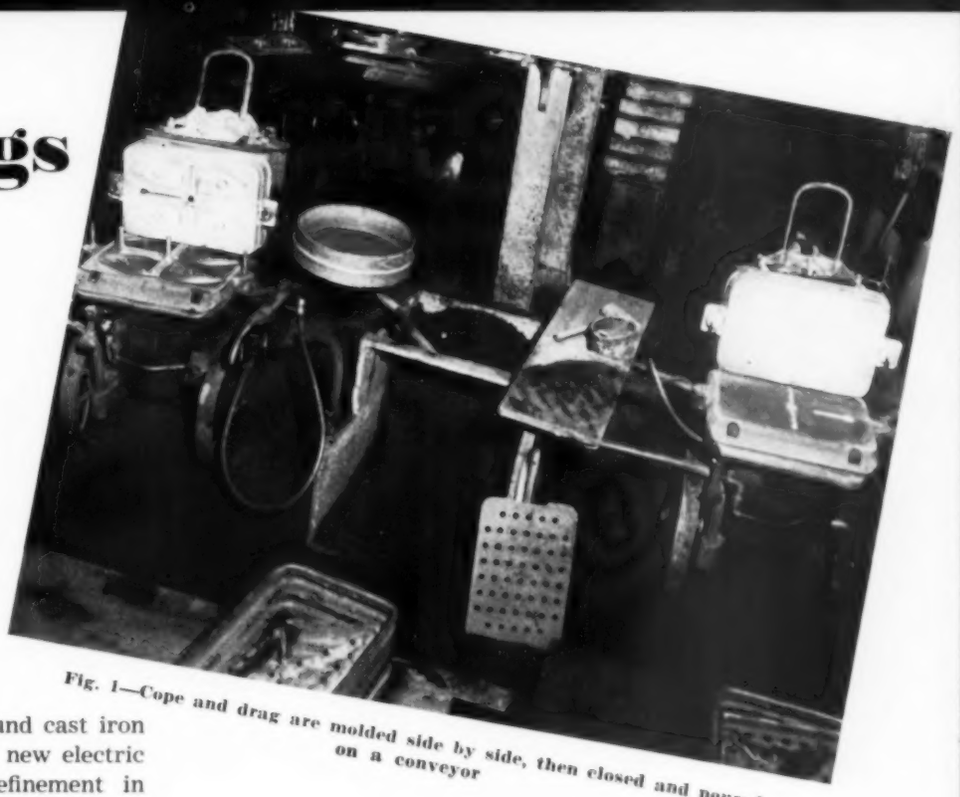


Fig. 1—Cope and drag are molded side by side, then closed and poured on a conveyor

RECENT development of a 2.1875-pound cast iron base to replace drop forgings for a new electric iron, has involved considerable refinement in foundry practice at the Cleveland works of the Westinghouse Electric & Mfg. Co.

Rigid requirements include: 1. Very close dimension tolerances; 2. castings suitable for plating after grinding; 3. iron to stand 20 ton pressure in assembly; 4. readily machinable iron; and 5, exceptionally smooth casting surface. Flat surfaces must not exceed plus or minus 0.005-inch from the neutral, or plane surface, and other specified dimensions must be held to plus or minus 0.010-inch.

Production equipment includes four precision machined iron patterns, mounted on machined iron plates, with flat gates extending the full length across the heel, and filleted at the junction of the pattern to prevent breaking into the castings. Patterns are set up on jolt-squeeze molding machines and molded in steel flasks 12 x 18 inches with 4-inch cope, 3-inch drag, and aluminum bottom plate. This type of flask equipment assures a rigid mold, which cannot become distorted or cracked in handling or traveling on the conveyor.

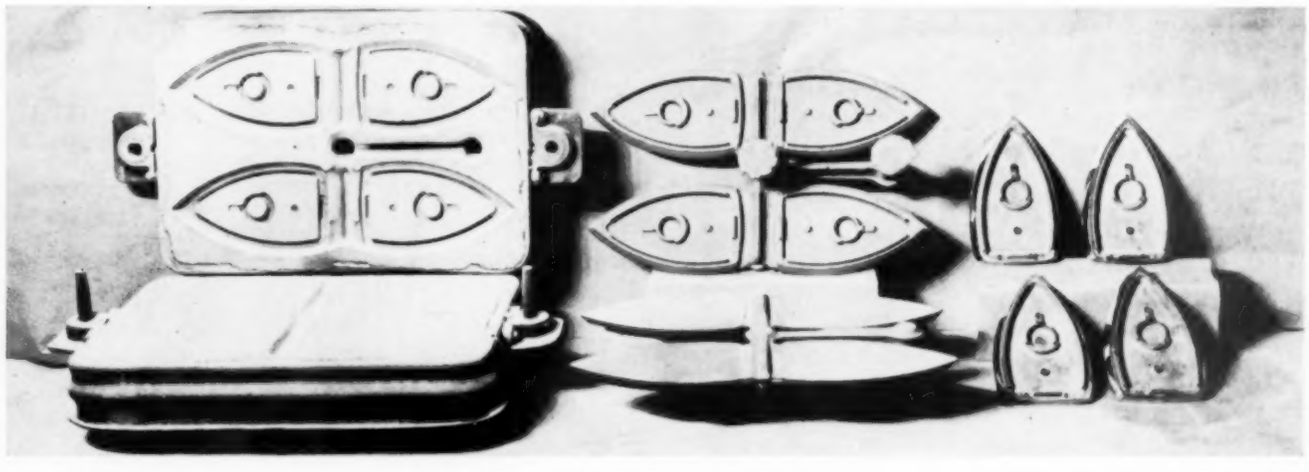
One molder makes the drag, or lower half of the mold and places it on the conveyor. A second molder makes the cope, or upper half of the mold, and places it on top of the drag.

A specially prepared, high permeability, or open facing is used in the drag. This allows free exit of mold gases and assures a solid, clean face on the bottom of the casting. The bottom of the casting must be free from any imperfection so as to take the plating perfectly.

In the cope, or upper half of the mold, the pattern first is faced with a specially prepared facing, to insure a smooth upper surface on the casting. This exceptional smoothness is necessary because this face, although not machined, must be free from any high spots, points, or pimples which would puncture the element when assembled. Any low spots, or depressions on this upper face would cause hot spots in the assembled iron.

After the facing operations have been performed, both drag and cope are filled with the regular conveyor system sand, secured from (*Please turn to page* 84)

Fig. 2—Castings are molded four in a flask with the flat face in the drag. The metal flows through a T-shaped runner in the cope and enters each mold cavity through a thin gate the full width of the casting



QUESTIONS and ANSWERS

This department includes problems relating to metallurgical, melting and molding practice encountered in making castings. Questions from subscribers addressed to the Editor of The Foundry will be answered by members of the editorial staff, supplemented where occasion requires by the advisory staff.

Cracks and Blisters In Cores Permit Iron To Enter

We shall appreciate your advice on the best core sand mixture for cores ranging from 5 to 15 cubic feet. Usually these cores are surrounded entirely by iron and the gas must escape through two or three pipes. What is the best wash or blacking for these cores? We have trouble with cracks and blisters on the surface of these large cores which allow the iron to penetrate.

Satisfactory cores can be made in such a wide variety of mixtures that a specific mixture for any given purpose only can be developed with a full knowledge of all the materials on hand. Which is only another way of saying that combinations of practically any kind of sand and binders may be manipulated to serve the purpose. In some sections of the country a natural loam is available which requires hardly any artificial binder. In other places sharp sand is available, but a certain amount of molding sand must be mixed with it to prevent sagging and distortion, particularly in high cores.

Manufacturers of core binders have developed their products to a point where satisfactory cores can be produced in a wide variety of sands, provided the binders are used according to the manufacturers' directions. The ideal core is one that is perfectly dried and is sufficiently porous for the gas to travel freely to and through the exits provided for the purpose. The binder is present only in sufficient quantity to hold the grains in contact until the core has served its purpose. Then the residue of the binder is consumed by the heat and the grains of sand are free to flow through the openings in the wall of the casting .

Naturally these properties are required in a higher degree in a core entirely surrounded by iron, than in a core where greater or lesser areas are not covered by metal. From your reference to cracks and blisters it is apparent that the present cores are too hard, that is they contain either too much clay, too much artificial binder or both. Obviously, the remedy is to reduce this factor to the minimum. To reduce the amount and to facilitate the escape of the gas, the greater part of the interior of the core should be filled with coke, cinders or rubble of broken cores from the cleaning room.

In the event that sharp sand, sea, lake or river, forms the base for your present cores, a typical mixture will contain 3 parts sharp sand, 1 part molding sand, bonded with the minimum amount of cereal, pitch base, proprietary liquid or oil binder. Cost of the sand may be reduced to some extent by incorporating old core sand up to 50 per cent in the mixture. If the core cracks and blisters under the influence of the molten iron, no blacking or wash will produce a clean surface on the casting. On the other hand if the iron lies quietly against the core practically any of the commercial blackings will produce a smooth, clean surface. Certain grades of blacking are especially designed for use on exceptionally heavy castings.

Discusses Problems In Making Smooth Matchplates

We are making aluminum matchplates of small gated castings; some having as high as 100 to the gate. We would like to know if we could obtain a matchplate that would not have to be finished after casting. We use a fine Windsor Lock sand for facing; spray with molasses water and dry with a blow torch. Are we using the right thing to spray the mold with? How long should the sand be dried? Would it be possible to make a hard match of some sort?

The first part of your inquiry on matchplates relative to finishing is not quite clear. Presumably, however, you are having trouble in obtaining a nice smooth finish on the castings. Without having a specimen on hand to ascertain the possible causes, only suggestions can be made on reasons for your trouble. Possibly you

are pouring your aluminum alloy too hot which in addition to permitting the alloy to penetrate between the sand grains, also results in lower physical properties.

You mention that you are using a fine facing sand which should give a smooth surface, but it is possible that you may be ramming it a little too hard to permit suitable venting of the gases generated when the molten metal strikes the sand. However, generation of gases should be at the minimum point, since you skin dry the mold. Possibly you are not drying sufficiently although it is quite possible to make matchplates without skin drying provided the molding sand is made on the dry side. Length of time occupied for skin drying depends upon the moisture content of the sand. Usually, the operation is considered finished when the sand surface assumes a rich golden brown color, and the surface just can be scratched by the fingernail.

There are many compositions available for making hard sand matches which can be purchased or made in your own shop. One that is used successfully consists of 25 parts of new molding sand, ⅛-part of litharge and ½-part of linseed oil. These are carefully mixed together and then tempered with water so that it has the same consistency as your regular molding sand. It is handled in the same way as molding sand and after the match is made, it is dried in an oven.

Minor Variation In Deflection Should Not Be a Factor

We are making some cast iron diesel engine cylinder liners for the government. The casting is approximately 2 inches thick, 48 inches in length, 22 inches inside diameter, weighs 2300 pounds and must conform to the following specifications: Tensile strength 35,000 pounds per square inch, transverse 2400 pounds and deflection 0.24-inch on 1.20 inch diameter bar resting on 18-inch centers, brinell on finished bore 190-220, nickel 1.25-1.50 per cent, chromium 0.45-0.55 per cent, sulphur 0.11 per cent maximum. To meet these specifications our iron shows: Carbon 3.32 per cent, silicon 1.36 per cent, manganese 0.66 per cent, sulphur 0.10 per cent, chromium 0.508 per cent, nickel 1.47 per cent, brinell 212. However, due to the bar being mottled we cannot get a higher deflection than 0.22-inch. To meet the chromium and brinell specifications we claim that it is impossible to reach the specified deflection in the test bar.

We are inclined to agree with your contention that if the customer insists on a definite composition, with the content of each element rigidly specified, he is not justified in insisting on arbitrary physical properties in the resulting casting or test bar. If he insists on certain physical properties and then allows the foundryman to use his own judgment in making a mixture that will produce these physical properties, no person can question his right. From a common sense viewpoint the probable effect of the difference between a deflection of 0.22 and 0.24-inch on a 1.20-inch diameter test bar broken between 18-inch supports is not worthy of consideration. Particularly where the iron conforms so closely to all the other specifications as laid down. Every practical foundryman knows that the same iron poured into a 2-inch section and a 1-inch section will not show the same grain structure or physical properties.

A 1.20-inch diameter test bar does not truly represent the sections involved in the liner casting. While it may be necessary to run the chromium up to the high side for the casting it is obvious that the structure in the test bar will be somewhat mottled and considerably harder than the iron in the liner. This is especially true with the silicon in the neighborhood of 1.36 per cent, a silicon content quite suitable for the casting. However, the brinell hardness of 212 would not indicate any mottling in the test bar, provided this brinell reading was taken on the test bar.

Ross-Meehan Foundries, Chattanooga, Tenn., is maintaining an attractive exhibit in the central window of the Chattanooga Manufacturers' association. Considerable interest has been aroused through the experiment of the association in asking each of its members to display its product for one month in a window located in the heart of Chattanooga

Dry Sand Cores for Inside of Irons

We are forwarding for your inspection a box type sand iron which is causing us considerable trouble. We shall appreciate your opinion on the best type of pattern equipment and molding practice to secure satisfactory castings.

The best type of pattern equipment and molding practice for any casting depends to a considerable extent on (a) the number of castings required and (b) the available class of molder. Manifestly a foundryman would not be justified in making a large capital outlay for elaborate pattern equipment to produce a comparatively small number of castings. On the other hand only exceedingly skilful molders can produce satisfactory castings from inadequate pattern equipment.

In the present instance and without a knowledge of local conditions the following method is suggested. Obviously it may be accepted wholly, or it may be adapted or modified to meet special conditions. Incidentally, in connection with the windows in the sides and end of the casting, if these are intended merely to admit air, a change in design, a row of smaller holes would greatly facilitate the making of the mold. Since the bottom face of this casting presumably is ground and polished, the logical place for this part of the casting is in the drag.

It is easier to mold the casting in the opposite position, but the risk of dirt lodging in the finished face is greater. The inside of the casting and the windows are formed with dry sand cores. Thus the patterns merely are plain blocks conforming to the shape of the outside of the casting. Four patterns are mounted on a board as shown in the accompanying illustration, to be poured through a single sprue in the center.

The drag is rammed on a plain flat board or plate. The cope is rammed, lifted off and laid upon its back on a pair of horses or other suitable support. The dry sand cores are lowered into the prints. They are anchored in place with a wire, a hook, a bolt or by any other suitable device. The five small window cores then are placed in their respective prints in the main core. These small cores are tapered at the back so that when they are pushed down into place they will not scrape the side of the mold. A small dab of paste at the back will hold each core in place when the cope is turned over.

With very nice and accurate pattern equipment, and accurately machined flasks, the castings could be made in an all green sand mold. This would involve the use of a three part flask and patterns split vertically for removal of the cores. However, the method outlined involves a minimum expenditure for pattern and flask equipment, and under ordinary operating conditions will produce satisfactory castings.

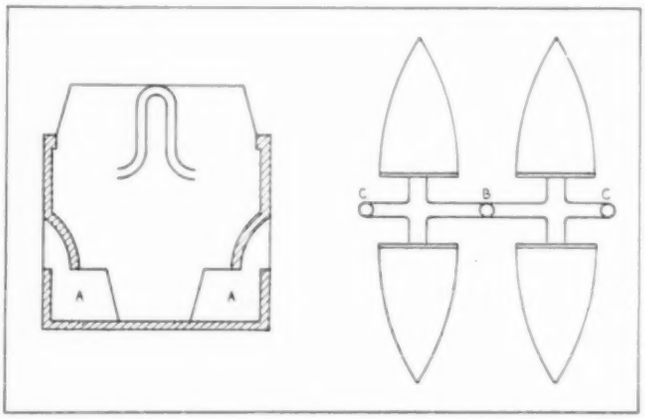


Fig. 1 Left—Vertical cross section of casting at windows showing application of window cores AA. Fig. 2, Right—Metal is poured down sprue B. The risers CC are dirt catchers

Describes Humidity Designations

What is the difference between actual and relative humidity, and actual saturation? Which is the most important to use in relation to volume of air used when melting iron?

Actual or absolute humidity is the weight of steam or moisture in a given volume or weight of air at a definite temperature, and it usually is expressed in grains per cubic foot or per pound. Relative humidity is the ratio of the weight of steam or moisture in a given volume of air to the weight which the same volume is capable of containing when fully saturated at the same temperature.

Saturation or dew point is that point at which no further moisture can be held in the air at that temperature, and is indicated by the fact that reduction of the temperature causes condensation of some of the water vapors. The one definition that will be used in connection with air used in melting iron is the actual or absolute humidity because you only are concerned with the actual amount of moisture in the air at a given temperature.

Facing Effect on Molding Sands

What is the effect of graphite in the facing of a molding sand. What reactions take place between the molten metal (in particular, gray iron and irons with steel additions) and the graphite in the facing. To what extent does the graphite protect the backing sand from the excessive heat of the molten metal. Does graphite affect the permeability of the sand heap. To what extent if any is graphite superior to sea coal as a facing agent. Which form of graphite, crystalline or amorphous, is the better for facing purposes. How does pitch act as a facing. What is the effect upon the condition of the sand heap.

The general tenor of these questions would seem to indicate that you are under the impression that graphite is added to the sand in the same manner as sea coal. As a matter of fact, graphite never is added *to* or mixed with facing sand in the sense that sea coal, pitch, or other agents are added. Graphite is applied either in a wet or dry state merely as a coating on the surface of the mold. Method of application and functions of the materials are entirely different. For a complete exposition of facing materials used in the foundry consult Chapter VIII *Principles of Iron Founding* by Moldenke.

Many of the points raised have been covered in the *Question and Answer* department of THE FOUNDRY over a period of many years. An interesting paper on some of the effects of sea coal appeared in the Jan. 15, 1932 issue of THE FOUNDRY. Touching briefly on the other questions in the order of presentation: Observers have noted no reaction between molten iron and the graphite on the mold surface. 2—Graphite is used solely because it is a refractory material. 3—The amount of graphite used on a mold is not sufficient to affect the permeability of the sand heap. 4—Since the effects of graphite and sea coal arise from different causes, comparison is not pertinent. 5—Graphite is a crystalline form of carbon, and therefore the term amorphous graphite is a misnomer. 6—Pitch practically has the same effect as sea coal when used in facing sand. Effect of either on the sand heap practically is the same, that is slightly detrimental unless proper precaution is observed in reconditioning the sand.

Stops Cores Bending In the Bushing

We are having trouble in the production of 12-inch bronze bushing bars with the cores deflecting in the center. The round stock cores are made in halves and pasted. We use as large rods as possible. We also have used anchors formed in the shape of a *U*. This anchor obviously makes an unsightly casting as well as causing minor blows around the anchor. In the thin section bushings, it causes misruns on the upper side. How may we solve this problem?

Your problem of the deflection in the cores of 12-inch stock bars has caused many foundrymen trouble. Of course, you can use cores produced on a stock core machine which squirts the entire core in one piece. You increase the stiffness, provided bars are inserted. It is common practice to use these extruded cores which have a round vent hole extending through them by inserting in the vent hole a square stiffening wire. The square wire does not fill the vent hole due to its shape, thus permitting room for the escape of gas and increasing the stiffness of the cores. This reduces the trouble with a bending of cores under strain of the rising flood of metal during the filling of the mold. It is not an entire cure since the necessary strength is not always available to resist this pressure. This is particularly true in small size cores in large size bushings where thick walled castings are desired.

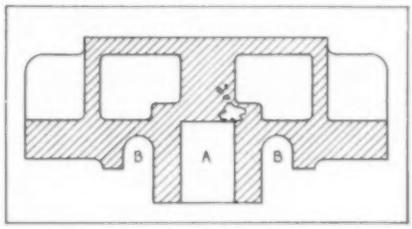
The surest way to correct that evil is to cast the bushings on end and have the metal rise around the core uniformly so that there is no difference in the pressure or temperature on one side of the core as against the other. That, however, means an expensive method of molding and therefore, where it is possible, the stiffened core is used and the castings are cast on their side.

Chaplets or anchors are not desirable and are an ever present source of complaint from the customer and should be avoided. Furthermore, most of the bushings are used for bearings and chaplets do not serve as a satisfactory bearing material. Pouring the metal as cold as possible also tends to reduce the burning effect of the metal on the cores and does in a small way help to prevent weakening of the core in its resistance to the deflecting pressure.

We would suggest that where possible, a solid core should be used instead of cores made of halves pasted together. It should be well rodded to give it strength. Where the size of the core is such that it cannot be stiffened to meet the deflecting pressure, the casting should be poured so that the metal rises around the core uniformly covering it on all sides and thus producing no tendency to deflect its straightness. Pour the metal at as low a temperature as a sound casting will permit and thus reduce the burning effect on the core.

Defect Is Caused by Improper Vent

We are forwarding for your inspection part of a small casting in which a cavity appears in the neck after the casting is partly machined. In a lot of 10 castings, five were solid while five showed the defect as indicated. We shall appreciate your opinion on the probable cause of this defect.



Agitation of the metal over core A and ridge B caused defect shown

The defect in the casting submitted has every appearance of being caused by a slight agitation of the metal in the vicinity. The agitation in turn probably is due to lack of vent in the center core *A* and in the ridge of sand *B*. From the fact that some of the castings showed the defect and others were perfect it is apparent that only a slight adjustment in the venting arrangement is necessary to secure all satisfactory castings. Use a little less binder in the center core and run a vent wire down through the print before the core is placed in the mold. The ridge of sand *B* may be a little too hard or a little too damp. Change these conditions slightly and you should have no further trouble.

Figuring Weight of Various Castings

What is the shortest and simplest method for figuring the weight of iron castings. For example how would you figure the weight of a round disk 10 inches diameter and 2 inches thick; a bushing 5½ inches outside diameter, 1¼-inches inside diameter and 8 inches in length; a plate 12 x 14 inches, 1-inch thick, etc.

A cubic inch of cast iron weighs 0.26-pound, or approximately ¼-pound. Hence, to find the weight of a casting the volume is reduced to cubic inches and the result either multiplied by 0.26 or divided by 4. The result is the weight in pounds. A cubic foot of cast iron, that is a block 12 x 12 x 12-inches weighs 450 pounds. This factor may be employed instead of cubic inches for large castings and will, of course, simplify the calculations.

A square foot of cast iron, that is a plate 12 x 12 inches, 1-inch thick weighs 37.5 pounds. This factor may be used on large, thin castings. For small and medium size castings the cubic inch factor is employed in the following formula: $L \times W \times T \times 0.26$ where L is the length, W is the width and T is the thickness. Thus in the example you submit, a plate 12 x 14 x 1-inch, the weight is found by first multiplying 14 by 12 = 268. This figure then is multiplied by 0.26 = 43.68 pounds. For 2 inches thick this result would be doubled, 3 inches trebled and so on for any desired thickness.

The usual method of figuring the weight of a circular plate, disk, or cylinder is to the square the diameter in inches, multiply the result by 0.7854, multiply that result by the thickness of the casting, and finally multiply that result by the constant 0.26. Thus the formula for your disk would be 10 x 10 x 0.7854 x 2 x 0.26 = 40.84 pounds. However, there is a shorter way for figuring the weight of round flat castings. By the use of the constant 0.206, two of the foregoing steps may be omitted. To find the weight of a circular iron casting 1 inch thick the rule is to square the diameter in inches and multiply the result by the constant 0.206. The answer will be the weight of the disk in pounds.

In the example submitted for illustration the figures would be set down: 10 x 10 x 0.206 x 2 = 41.20 pounds. This same rule may be applied to the cast iron bushing 5½ inches outside diameter, 1¼-inches inside diameter and 8 inches long. First figure the weight of a solid bushing 5½ inches diameter. Then figure the weight of an imaginary bushing 1¼-inches diameter. Subtract the second from the first and the result is the weight of the actual bushing. The first calculation would be 5.5 x 5.5 x 0.206 x 8 = 49.85 pounds. The second would be 1.25 x 1.25 x 0.206 x 8 = 2.57 pounds. Taking 2.59 from 49.85 leaves 47.28 pounds as the actual weight of the casting. All rules for calculating the weight of castings are based on the cubical content. The only short cuts are found in formulas which have been developed for finding the cubical content of irregular shapes. These formulas are incorporated in *The Foundryman's Handbook*, a publication containing all the rules, formulas, specifications and other related data required in the operation of a foundry. That publication may be purchased through THE FOUNDRY.

O. W. Potter

P. T. Bancroft

William C. Baird

Neal J. Crain

MEN of INDUSTRY

O. W. POTTER, assistant professor, drawing department of the college of engineering and architecture, University of Minnesota, Minneapolis, has been made president of the Twin City Foundrymen's association. Mr. Potter attended Mechanic Arts high school in St. Paul and graduated from the University of Minnesota in 1914 with a degree in mechanical engineering and in 1925 received his masters degree in metallography. His father was a molder and as a result Mr. Potter spent his vacations during high school and college working in the foundry.

After finishing at the university, he worked as geologist for the state of Wisconsin. In the fall of 1914 he became mechanic in the Gas Traction Foundry Co., later the Northwestern Steel & Iron Corp. of Minneapolis. He was with that organization until November, 1919, occupying positions as foundry engineer, sales manager and production manager. In the fall of 1919 he began his teaching career in the drawing department of the college of engineering and architecture, University of Minnesota. In 1927 he obtained a leave of absence from the university and was made manager of the Winona Machine & Foundry Co. Early in 1928 he joined the Sand Products Corp., Detroit, as technical advisor and service engineer. He returned to the university late that year. Mr. Potter has been active in local foundry activities and is a member of the Society for the Promotion of Engineering Education, the American Foundrymen's association, and the Twin City Foundrymen's association. Seven years ago he organized a course in foundry practice in the extension division of the university, which is still in operation and last spring it was necessary to have two classes with a total enrollment of 44. Mr. Potter also has contributed numerous articles to THE FOUNDRY.

♦ ♦ ♦

NEAL J. CRAIN has been appointed purchasing agent of United Engineering & Foundry Co., Pittsburgh. He was formerly assistant to G. Walter Sanborn, who continues as vice president of the company in charge of purchases and traffic. Mr. Crain has been with the company over 20 years, except for a period during the World war.

♦ ♦ ♦

P. T. BANCROFT, Moline, Ill., recently was elected chairman of the Quad-City chapter of the American Foundrymen's association. Mr. Bancroft was born in Columbus, O., in 1867 and was educated in the public schools of that city. He learned the machinist trade in the Hocking Valley railroad shop, Columbus. He then was connected with the Pennsylvania railroad shop and the Jeffrey Mfg. Co., where he worked on the first electric locomotive built by that company. Mr. Bancroft then had charge of the C. S. & H. railroad shop, Columbus, and in 1896 went to Chicago to take charge of the C. R. I. & P. shop. Later he was transferred to Rock Island, Ill., and since that time has resided in the Quad-City territory. In 1909 he became connected with Deere & Co., Moline, Ill. as foreman of the toolmakers. He took charge of the foundry of the John Deere Harvester Co., March 1, 1920 and served as foundry superintendent until he retired several years ago. Mr. Bancroft is a life member of the American Foundrymen's association.

♦ ♦ ♦

WILLIAM C. BAIRD, secretary and treasurer, Buffalo Pipe and Foundry Corp., Buffalo, has been elected a director of the Manufacturers & Traders Trust Co., Buffalo.

♦ ♦ ♦

A. E. MORGAN, formerly general manager, Dalton Foundries, Warsaw, Ind., now is connected with the Erie Malleable Iron Co., Erie, Pa.

♦ ♦ ♦

E. E. HORN, Marietta, Ga. has been appointed a zone representative for the Roots-Connersville Blower Corp., Connersville, Ind., to cover North Carolina, Georgia and Florida. GEORGE P. SCHUMACKER, Cleveland, has been placed in charge of distribution of industrial pumps in the Cleveland area. CHESTER WING, Cincinnati, is supervising turbine sales in adjacent counties of Ohio, Indiana and Kentucky, and JAMES T. CASTLE, Pittsburgh, through his associate D. J. MCCONNELL, has charge of selling in the

(*Continued on page 42*)

The main building of Hercules Experiment Station. In this building is the core testing laboratory where research and development work are carried on to perfect all types of cores made with Truline Binder.*

Truline Binder, a Hercules product, is a powdered dry bond binder used wherever metals are cast.

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(*Continued from page* 40)

western portion of the Keystone state as well as in the bordering counties of the states of Ohio and W. Va. E. A. McCALLUM, San Francisco, has been appointed distributor of the company's products in the northern half of California and the industrial bay section.

♦ ♦ ♦

WARREN C. DRAKE, 21 West street, New York, has been appointed New York representative of the Ironton Fire Brick Co., Ironton, O.

♦ ♦ ♦

PAUL FIELDEN, credit manager, Norton Co., Worcester, Mass., recently was elected president of the National Association of Credit Men.

♦ ♦ ♦

WILLIAM D. DUNN recently was appointed superintendent, Marion Malleable Iron Works, Marion, Ind. Mr. Dunn formerly was superintendent of the Acme Steel & Malleable Iron Works, Buffalo for 4 years, and prior to that was connected with the Frazer & Jones Co., Syracuse, N. Y., for 15 years.

♦ ♦ ♦

SIMEON JESTER JR., formerly with the sales department, Philadelphia office of the American Engineering Co., has been transferred to the Chicago office of that organization.

♦ ♦ ♦

G. W. HOSKINS, recently connected with the Lincoln Electric Co., has joined the Harnischfeger Corp., Milwaukee, as sales engineer for welders and rods in the Philadelphia territory.

♦ ♦ ♦

PAUL JONES, veteran newspaper man and promotion editor for the *Cleveland Press* for the past 2 years, has been named director of the publicity division, National Safety council, Chicago, succeeding Tom A. Burke who has resigned to become executive secretary of the Advertising club, New York.

♦ ♦ ♦

FRANK PUTNAM, formerly assistant to the manager of industrial sales, Lowe Bros., Dayton, O., has been appointed assistant merchandising manager of the Renown Stove Co., Owosso, Mich.

♦ ♦ ♦

WILLIAM E. BLAKE, Carborundum Co., Niagara Falls, N. Y., has been elected president, Purchasing Agents Association of Buffalo. BERNARD T. LOFT, Bethlehem Steel Co., Lackawanna, N. Y., is the new vice president.

♦ ♦ ♦

Charles Luton, formerly sales engineer, SPO Inc., Cleveland, has become connected with the Jeffrey Mfg. Co., Columbus, O., as sales engineer in the foundry equipment division. Mr. Luton's experience in-

(*Concluded on page* 59)

Eaton-Erb Foundry Co., Elects New Executive Staff

Joseph L. Dostal

H. L. Pierson

Edward C. Hoenicke

H. L. PIERSON, president, Detroit Harvester Co., Detroit, and a member of the board of directors, Eaton Mfg. Co., Cleveland, recently was elected chairman of the board of directors of the Eaton-Erb Foundry Co., Detroit. JOSEPH L. DOSTAL, formerly vice president in charge of engineering and research, has been advanced to the position of president, and EDWARD C. HOENICKE, formerly sales manager, has been elected vice president and a member of the board of directors.

Mr. Pierson is one of the leading industrial executives of Detroit and is a member of the board of directors of the Detroit chamber of commerce. He has been active in various manufacturing enterprises for a number of years and obtained his foundry experience at the plant of the Packard Motor Car Co., Detroit, where he served under the late Fred B. Erb. THE FOUNDRY extends a cordial welcome to Mr. Pierson upon his return to active participation in the foundry industry.

Mr. Dostal's entry into the foundry industry began with the development of the permanent mold process by the Holley Carburetor Co., Detroit. He has had wide experience in various kinds of manufacturing, having held numerous executive positions with the A. O. Smith Co., Milwaukee; the Detroit Pressed Steel Co., Detroit: the Diamond Mfg. Co., Detroit, and the Holley Carburetor Co. Mr. Dostal was placed in charge of the permanent mold development by the Holley Carburetor Co. and under his direction, the Holley Permanent Mold Machine Co. Inc. was organized and a modern foundry constructed to produce castings and also to manufacture permanent mold machinery.

Mr. Hoenicke entered the foundry industry in 1916 with the Oliver Machinery Co., Grand Rapids, Mich., where he served a manufacturing apprenticeship in foundry operation, patternmaking and machine construction. Previous to his connection with the permanent mold process, he held numerous positions with the E. S. Bryant Pattern Works, Detroit; the American Blower Co., Detroit; the Bohn Aluminum Co., Detroit; the Ford Motor Co., Detroit; and Oakland Motor Car Co., Detroit. In 1928 he left his position with the latter company as foundry advisor with sources of supply, to assume the position of sales engineer with the Holley Permanent Mold Machine Co. Inc.

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Over the years, performance records of Osborn Moulding Machines have won praise from foundrymen all over the world. This long established reputation for dependable operation gives YOU a very definite assurance of lasting satisfaction when you place your trust and investment in Osborn Moulding Machines.

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TIME PROVES VALUES

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The Apprentice Views The Foundry Show

DURING the convention and exposition of the American Foundrymen's association held in Milwaukee in May, apprentices from the Milwaukee area invited to attend the exhibit, were instructed to prepare written reports for their teachers and supervisors.

The association offered three prizes as follows: (1) $15.00, (2) $10.00, (3) $5.00, for the best essays or reports submitted by these apprentices.

About 75 written reports were submitted through C. L. Graber, apprentice co-ordinator, Milwaukee Vocational School, and were judged by a committee consisting of Chairman Bruce Simpson, vice-president, National Engineering Co.; J. D. Burlie, foundry engineer, Western Electric Co.; and Tom Brown, foundry instructor, Lane Technical high school, all of Chicago. The papers were judged from the standpoint of the manner in which they reflected benefits secured by the individual apprentice during his visit to the exhibition. They were rated by the reflection of the inspiration which the apprentice secured to further the effort and knowledge gained of methods and processes displayed.

The awards were as follows: First prize, Robert Jablonowski, Sivyer Steel Castings Co.; second prize, Anton Lemko, Jr., Motor Castings Co.; third prize, Gordon T. Wagen, C. M. St. P. & P. railway shops.

New Perspective

By Robert Jablonowski

SINCE I have been a molder apprentice for only a few months, my ideas of foundry equipment and production were, at best, hazy. The few opportunities I had to study foundry methods and practice outside of my work in the core room and pattern storage gave me only a conglomeration of irrevelant facts. But the chance to really study and listen to explanations, coupled with the generous literature, which the American Foundrymen's convention and foundry show afforded, made that opportunity a valuable asset.

The foundry show presented a combination of beauty and interest which is so rarely attributed to an exhibition of drab inanimate machinery and cold metal. Those few hours at the foundry show gave me a better understanding of the output and production of a foundry. It presented a new angle—interest—to what had heretofore been just a day's work unpleasantly combined with noise and smoke.

The clear concise explanations and exhibits gave me a chance to compare modern methods with those used in our shop and to study each in perspective. I have gained a knowledge of the relationship of each department with the next and how the work of each—totally different as it may be—overlaps the rest—core room, refinery, heat treating department, annealing department, finishing department.

I was extremely interested in the modern and highly efficient jolt squeezing stripper which removes the mold automatically. This, when compared with the waste of man power on unit floor jobs, made me really appreciate the value of this modern foundry machine. The complete operation of this machine was clearly demonstrated and this to me was one of the high spots of the show.

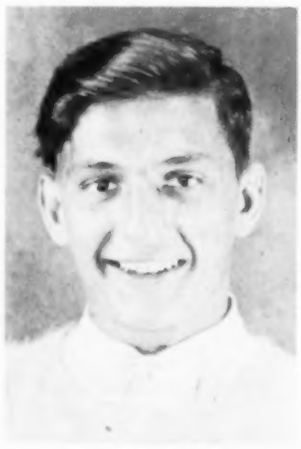
The numerous types of flasks also interested me greatly. The different shapes and sizes—flasks for radiators, three-part cylinder flasks, transmission and pulley flasks, flasks comprising cope, drag, chuks and upsets for delicate castings—this in itself requires technique and a knowledge of foundry practice.

The sandslinger exhibited was also a feature of the show and emphasized again the efficiency of modern equipment in production work. Coupled with this was the new speedmullor which features the use of centrifugal force and rubber covered muller balls to mull sand. Efficiency!

The exhibits were outstanding in that each was a feature of the show—the gyrators, core machines, auto-

(*Concluded on page* 47)

Robert Jablonowski



Anton Lemko Jr.

Gordon T. Wagen

ADVERTISING PAGES REMOVED

(*Concluded from page* 44)

matic riddles, abrasive blasting equipment—the reclaiming of the abrasive in the wheelabrator tumblast was outstanding as was its entirely automatic operations which eliminated almost all manual handling—the various types of furnaces and cupolas. The effects of refacting inclusions on alloy steel and other factors affecting pouring interested me greatly. This seems to be a subject which presents a large field for improvement.

Another comparatively modern idea featured was the effect of molybdenum on gray iron. It seems that the field of metallurgy will be of great importance in the near future. In combination with this I noticed that the University of Wisconsin, extension division, teaches the study of metal.

And last but not least—the exhibition of cores and core sands was of great value to an apprentice. There seems to be a possibility for an automatic core machine that will handle all jobs. What surprised me most was the fact that molasses is used as a binding agent.

In the short time I spent at the foundry show, I learned a great many things and gained an entirely new perspective on foundry work. I only wish that we could have spent more time at this outstanding exhibition of modern production in the largest industry in the world—steel.

Use Safety Devices

By Anton Lemko Jr.

I CONSIDER myself lucky to have the opportunity to attend the foundrymen's convention. On this visit I couldn't fail to notice that most concerns having foundry machinery at the convention, have installed in them the latest in safety devices.

As time marches on, so does industry. The industry that moves along the fastest it seems is the automobile industry. Motor blocks and cylinders have a tendency to crack due to the higher speeds and greater acceleration. A certain motor truck company has adopted a nickel-chromium alloy cast iron for its cylinders. The addition of these alloys in small percentages tend to produce greater uniformity in the structure of the castings.

One concern has developed a moisture testing device, that will test the moisture of a molding sand in 30 seconds. This tester does not require much storage space and can be operated by any man with an average intelligence. This in time will do away with weighing sand, heating it to take away the moisture, and weighing it again to see how much moisture was evaporated.

A core paste which has tremendous strength and is not sensitive to high temperatures is also on the market. As advertised, this core paste does not seep from cracks, and develops strength from either air drying or oven drying. Hot metal can be poured on the dried paste without the paste boiling.

A great many foundries still do their cupola charging by hand. According to a type of charger I saw, hand charging is a waste of time and hand power. The charger is filled with scrap at the ground floor and the person operating it presses a button which sends the charger upward, where the scrap is released right into the cupola.

In the cleaning process of castings, tumblers can be installed that do not throw off any dust at all. This is done by having water in the tumblers. In some plants this type of tumbler can not be used.

Safety shoes do not have to be heavy and clumsy looking. This type of work shoe can be gotten in a dress shoe, oxford or full shoe. While on the subject of safety, I am mentioning a safety device which every foundryman must wear at one time or another and this is safety glasses. I viewed a pair of glasses that had a hammer pounding away at them throughout the convention without as much as showing a crack.

The thing most important it seems to every workman is to wash up and get home as quickly as possible. But in a lot of plants, men have to wait in line in order to get to the sink. The thing that interested me was the new type of wash trough I saw. It was built on the order of a bird bath or a water fountain, where the water comes from a spout in the middle and falls to the inside of the bowl. On an arrangement like this, 10 to 12 men can wash up at one time.

In my opinion this convention was held in order that foundrymen can see what kind of work is being done by his neighbors, and see how foundries have advanced in recent years all over the world.

Gigantic Industry

By Gordon T. Wagen

EVERYTHING in the foundry line from a chaplet to technical discussions might be the easiest way to describe the 1937 A.F.A. convention held at Milwaukee, May 3-7.

As an apprentice, attendance at the convention was to me an absolute necessity. I had never realized the immensity of the foundry industry so that the convention exhibits were quite a surprise. Working in a foundry where there are but two molding machines had given me the impression that machines were not used extensively in foundries. The convention, however, changed my mind on this matter. Gigantic sand-slingers and cutters, pneumatic molding machines, tumbling mills, sandblasting equipment, ladle equipment, sand mixing machinery and the numerous displays on sands, ores, and refractories impressed me as to the diversity of machinery in use in the industry and the dependence of other industries on the foundry. Page after page could be written describing the various exhibits of machinery on display.

Safety to the worker on the job was definitely one of the most important subjects covered at the convention. Displays of safety equipment included goggles, safety shoes and helmets, gas masks, respirators, and protective clothing.

The scientific side of the industry displayed the progress made in improvement on sand control, melting of metals, alloys and other phases of foundry work. One of the most interesting exhibits was that of old Chinese castings. Although crude in comparison to modern castings, these castings were made under the most difficult conditions and it is almost miraculous that they were made at all.

Only now do I realize the part I am taking in a gigantic industry. At first I was frightened, but stopping to think has made me overcome this fear and make me want to do my work to the best of my ability.

Boiler Feed-Water Data Published

The United States department of the interior, bureau of mines, Washington, has published a handbook entitled "Questions and Answers on Boiler Feed-Water Conditioning." Edited by J. F. Barkley, the publication gives information of value to boiler operators who have not studied chemistry.

What impurities may be carried by water, what causes corrosion or pitting in the boiler, what methods are used to prevent caustic embrittlement in the boiler, how is a water sample tested for sulphate and how should water be sampled for testing are a few of the representative questions included, answers to which are given immediately following. The booklet is for sale by the superintendent of documents, Washington, for 20 cents.

Solving Problems Encountered In Nonferrous Foundries

By R. J. KEELEY
Ajax Metal Co., Philadelphia

HAVING in mind that considerable research work is being done in the solution of nonferrous foundry problems, it is the author's purpose to contribute a few experiences in connection with the use of composition ingot metal for the production of sand castings.

Among the many problems confronting foundrymen, the selection of the proper alloy for a specific use is one of vital importance. For example, in a foundry engaged in the production of pump bodies of antiacid metal containing 75 per cent copper, 15 per cent lead, and 10 per cent tin, a complaint was received from one of its customers who had purchased a pump that failed after being in service only a few months. This copper, lead, tin alloy was developed primarily to meet the demands for a metal to resist the corrosive action of mine water containing a small percentage of sulphuric acid.

This particular pump was in service in Bermuda and it was necessary to handle the problem by correspondence. In the subsequent investigation, the defective pump parts were subjected to chemical tests and the corroded surfaces were found to contain approximately 3 per cent less lead than existed in the original castings. An analysis was then made of the pump water, which revealed that it was in reality sea water and contained a large percentage of soluble chlorides.

It was quite clear that this was responsible for the failure of the pump, as metal of such composition was not intended to operate in salt water. This is because of the strong affinity that chlorine has for lead. The pump was replaced with a copper-tin bronze containing 88 per cent copper, 10 per cent tin, and 2 per cent zinc, and after many months had elapsed, the pump still was operating satisfactorily. Had the nature of the water been known, the leaded bronze would not have been used and failure of the pump would have been averted. In this instance, the selection of the proper alloy was not made, due to the fact that the true operating conditions were not known.

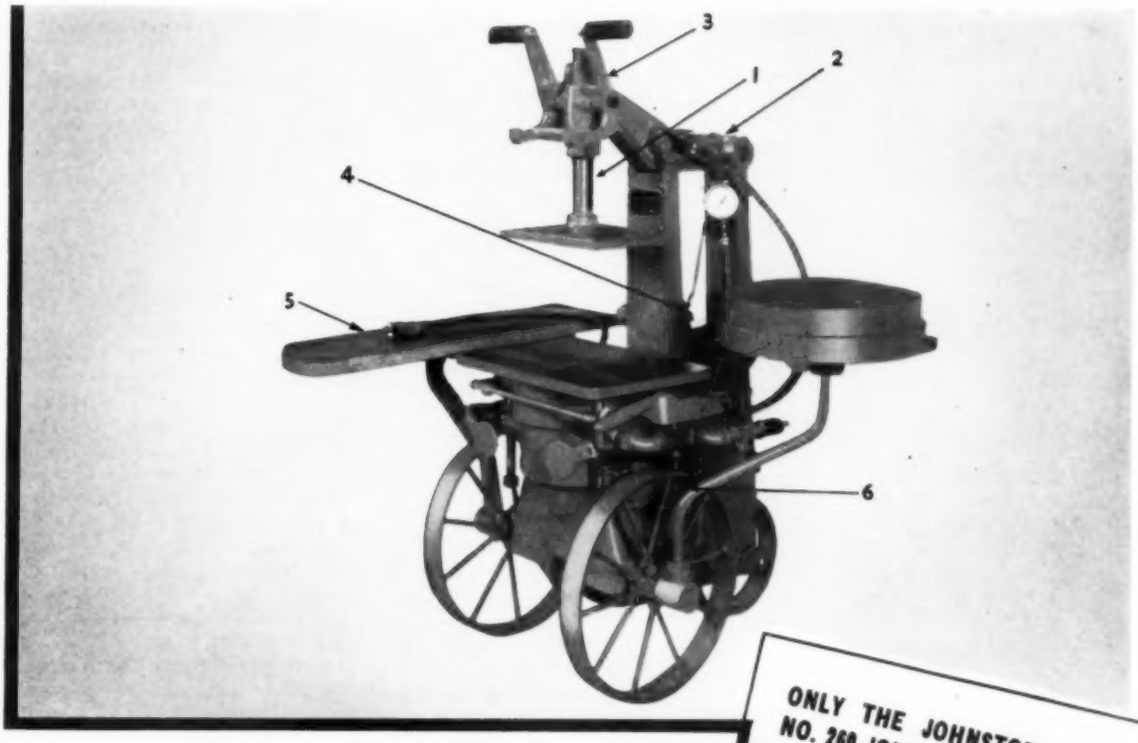
Another somewhat similar example was encountered in a foundry engaged in the production of meter bodies and parts with an alloy consisting of 85 per cent copper, 5 per cent lead, 5 per cent tin and 5 per cent zinc. This company received several complaints from failure of the meters in service. Investigation showed these failures to be due to a white deposit forming on the inside of the meters; this deposit accumulating to such a thickness that the meters would not record properly and had to be removed from service and replaced.

Since the meters that failed were

(*Continued on page* 50)

This article is abstracted from a paper presented by the author at a recent meeting of the Metropolitan Philadelphia Chapter of the A. F. A.

6 NEW FEATURES — *In One Machine*



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1 AN ADJUSTABLE SQUEEZE HEAD that permits the pressure plate to be set at *any* desired distance above the top plate by simply changing the setting of two lock nuts . . . thereby facilitating the rapid changing of the machine from one height flask to another, *by the moulder* . . . and conserving time and air.

2 PERFECTLY BALANCED SQUEEZE HEAD — spring controlled, and adjustable—to balance the squeeze head in the moulder's most convenient position . . . eliminating stretching and long reaching.

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5 CLOSING BENCH AND RIDDLE RACK newly designed and conveniently located . . . and furnished as standard equipment.

6 IMPROVED CUT-OFF VALVE for jolting—reducing air consumption to a minimum.

The JOHNSTON & JENNINGS *Co.*

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CLEVELAND . . . . . OHIO

(*Continued from page* 48)

in service at far distant points, it was first thought that the composition of the water in these localities was directly responsible. However, a series of experiments was outlined, which it was hoped would throw some light on the subject. Several rough castings were selected for test and were filled with ordinary city supply water and allowed to stand. A white deposit formed almost immediately.

This test then was repeated with chemically pure water with the same result. A sample of this white deposit was collected and analyzed, and it was found to be carbonate of lead. Therefore, this deposit only could be formed by the carbon dioxide in the atmosphere being absorbed by the water and reacting with the lead to form lead carbonate. Subsequent tests were made to determine to what extent the lead content should be decreased to prevent the formation of the lead carbonate deposit.

Alloy Eliminates Deposit

After numerous tests with alloys containing various percentages of lead, it was found that a composition of 86 per cent copper, 3 per cent lead, 3 per cent tin and 8 per cent zinc could be used without the formation of this deposit. Such an alloy was recommended to this foundry for all future castings to be used in contact with tap water and an added suggestion was made that the entire subject be investigated from a health standpoint.

Our firm sometimes receives calls for service from companies operating brass foundries in conjunction with gray iron foundries. In a number of instances the difficulties have been due to attempts to produce brass castings with the same pattern equipment used for gray iron. On several occasions, investigations have been conducted in regard to this and it has been found that the pouring sprues were located directly in the center of the mold. This made it necessary for the pourer to raise the ladle to an elevation of about 7 or 8 inches above the sprue, with the result that when the brass was poured in this manner, the metal was agitated greatly and excessive dross was formed. This does not occur when gray iron is poured under the same conditions.

On every occasion we have recommended that for brass castings, the gating be changed and that the gates be located on the edge or the end of the pattern, so that the pouring ladle can be held sufficiently close to the sprue, thus minimizing agitation of the metal. This example indicates that brass castings cannot be produced successfully by the same method of gating as is employed for gray iron.

An example of the improper use of fluxes may be shown clearly by consideration of the following problem and its solution:

In a foundry engaged in the production of miscellaneous valves and fittings with an alloy of 85 per cent copper, 5 per cent lead, 5 per cent tin and 5 per cent zinc, a considerable percentage of castings was found to be defective due to porosity. The melting equipment consisted of oil-fired, open-flame tilting furnaces of 1000 pounds capacity. The metal was transferred to ladles holding approximately 200 pounds of metal and thence to the sand molds.

This foundry reported having difficulty over a long period of time during which composition ingot metal was purchased from nearly all of the large producers. At the time of the first purchase of metal from our company, the foundry was adding as many as eight different fluxes to each heat. In addition to this, it was the practice to calculate a theoretically perfect 85-5-5-5 furnace charge, which made necessary the addition of small amounts of virgin metals to the composition ingot, notwithstanding the fact that analysis of the ingot metal supplied was well within the allowable limits of the specification.

Furnace Charge

Material	Pounds	Ounces
85-5-5-5 Ingot	440	0
85-5-5-5 Gates	350	0
Electrolytic Copper	57	1
Tin	0	5
Lead	4	0
Zinc	18	13
Boron Copper	5	0
50 Copper-50 Nickel Shot	5	0
Calcium Chloride	6	0
Borax	2	0
Salt	2	0
To each ladle the following additional fluxes were added:		
15% Phosphorus-copper Shot	0	2
Lead Oxide	0	3
Charcoal	Approx. 0	3

The accompanying table shows a typical furnace charge for the 85-5-5-5 mixture being used at the time. Upon further investigation, it was found that most of the defective castings were due to slag inclusions which no doubt were caused by the excessive amount of slag forming fluxes added to the metal.

A furnace charge was recommended which consisted of ingot metal, gates, borings and the elimination of all fluxes with the exception of a small amount of covering flux comprising 2 pounds of borax per 1000 pounds heat and the use of 2 ounces of 15 per cent phosphor-copper to each ladle. Subsequent heats produced from this mixture gave satisfactory results and the percentage of defective castings was reduced from approximately 20 per cent to not more than 3 or 4 per cent.

Oxidation of metal during melting is often responsible for defective castings. In a foundry engaged in the production of mine pump bodies and impellers, considerable difficulty was encountered from porous castings. Composition ingot metal containing 75 per cent copper, 15 per cent lead and 10 per cent tin was used for the metal requirements.

Porosity was confined chiefly to large impeller castings, which varied greatly in cross section. The porosity was found chiefly at the hub or heaviest section of the casting. Small impellers and other castings which were more uniform in cross section, were produced without any trace of these defects. The porosity appeared to be mainly a surface condition, penetrating to an average depth of approximately ⅛-inch, with a maximum penetration of about 3/16-inch. Examination of one of the large defective impellers revealed that the porosity occurred only at points where the metal came in contact with the core, and where the metal came in contact with the skin-dried surface of the mold.

Melting Practice Faulty

It was first thought that the difficulty was due to the use of improperly baked and vented cores. Subsequent experiments failed to support this contention. Attention then was directed to the melting practice. This consisted of melting in natural draft pit furnaces, using hard coal for a bed and coke for around the sides of the crucible. Size No. 100 graphite crucibles were used and the average furnace charge was 500 pounds per heat. All molds were poured direct from the melting crucible.

The melting time per heat was approximately 3 hours and the metal in the molten condition appeared to be sluggish and showed an excessive amount of dross. As a result constant skimming was necessary to clean the metal thoroughly before pouring. It was quite evident that the metal was highly oxidized and that the melting practice was at fault.

Investigation showed that the area of the flue from the furnace to the stack was 8 x 6 inches or an area of 48 square inches. This appeared to be too large and not consistent with good furnace design. Therefore the flue was reduced to an area of 36 square inches and further melts were made. This change in flue area produced immediate, good results. Subsequent heats

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ADVERTISING PAGES OMITTED

(*Concluded from page* 50)

were observed in the molten condition and the metal was clean and free from dross, and had good fluidity. Only a normal amount of skimming was necessary. Examination of several large impellers thus produced revealed that the castings were sound and free from porosity.

The solution to this problem may be explained by the metal becoming oxidized in the furnace during melting, because of the excessive area of the flue. This permitted an excessive amount of air to enter the furnace, which was absorbed by the metal. The gas thus absorbed was liberated during solidification of the metal in the mold and in attempting to escape was forced to the heaviest section, or that part of the casting which was last to solidify, this being the section the surface of which was next to the core.

There is no lack of diversity when attempts are made to list the various things that can happen to metal to cause trouble when these metals are started on their way to become definite articles of commerce such as valves, bearings, etc.

Bad Metal Not Cause

When a casting is observed containing some defect, the statement in many instances is made, namely *bad* metal. Although some foundrymen make this statement whenever they get into difficulties, it has been the author's experience, which covers many years in attempting to solve foundry problems, that when the real difficulties are unearthed, in less than 1 per cent of the cases involved was the trouble due to *bad* metal.

In closing, it is apparent that the method of procedure to be used in the solution of nonferrous foundry problems resolves itself into two general classifications:

1. A close inspection of a defective casting, together with a study of the foundry practice, in many cases will indicate to the experienced investigator the probable cause of the trouble, and a well directed change in procedure usually will result in the production of sound castings.

2. When the preceding method of procedure fails to attain the desired objective, it then becomes necessary to attack the problem by a process of elimination. That requires the establishment of standard foundry practice, namely, that all phases of production should be the same for every heat, such as—character of charge, type of furnace, melting time, pouring temperature, molding practice, etc. By varying only one of these phases at a time, keeping all other conditions constant, and with a study of the results, the cause of the trouble may be narrowed down and finally isolated. Having thus found the cause of the defect, corrective measures then can be applied for its elimination. While such procedure is looked upon by some foundrymen as being impracticable, costly and interfering with production, the time and effort thus expended may be more than compensated for by the savings resulting from the solution of the problem involved.

Book Review

A.S.T.M. Proceedings, 1936, *Parts I and II*, covering a total of 2091 pages in two volumes, published by the American Society for Testing Materials, 260 South Broad street, Philadelphia, and supplied by THE FOUNDRY, Cleveland, for $5.50 each in stiff paper cover; $6.00 in cloth; and $7.00 in half-leather, plus 15 cents postage, and in Europe by the Penton Publishing Co. Ltd., London.

These volumes of the 1936 proceedings are published in two parts, Part I comprising committee reports and the new and revised A. S. T. M. tentative standards. Part II gives all technical papers, including the Marburg lecture. Reports from 45 standing committees are included in the 1245 pages of Part I. This volume also includes 115 tentative specifications and test methods with a section of extensive reports on steel, wrought iron, cast iron, corrosion, magnetic properties, etc.

Other reports in Part I cover the society's work on copper and copper alloy wires, nonferrous metals and alloys, cement, brick, lime, preservative coatings for structural materials, and many other important products and processes for industrial use.

Part II is composed of 50 technical papers in addition to the eleventh Marburg lecture on "Developing American Glass." Five papers comprise the symposium on the limitations of laboratory and service tests in evaluating rubber products, and there are a number of papers on the general subject of metals. Other pertinent subjects such as high-velocity tension-impact tests, cementitious and related materials, effect of mineral fillers on the serviceability of coating asphalts, and testing for sludge formation receive their share of attention is this particularly valuable book.

"Alloys of Tin with Germanium and Beryllium" is the title of a bulletin issued by the International Tin Research and Development council, L. J. Tavener, U. S. representative, 149 Broadway, New York. The work was carried on by Prof. Guertler and M. Pirani, and it was found that addition of 0.35 germanium to tin decreased ductility by 20 per cent, increased brinell hardness by 100 per cent, and decreased bending strength by 50 per cent. Addition of 0.2 per cent beryllium increases hardness slightly, and improves ductility.

Training Boys for Foundry Work

WEST TECH
OBSERVES
SILVER JUBILEE

High school annually fits scores of boys and girls for shops, drafting rooms and to be home makers

WEST TECHNICAL HIGH SCHOOL, Thursday and Friday will celebrate 25 years of service in grooming industrial Cleveland. With its 1400 students, it is the largest high school in Ohio, and takes normal pride in its career between its curriculum when set up marked a departure from standard education, a departure dictated by changing times.

Throughout the country, the foundry industry is receiving more publicity in connection with the training of boys for work in industry. This clipping is reproduced from a recent Sunday issue of the Cleveland Plain Dealer, and shows how the artist has featured foundry practice as the main illustration in an article on West Technical High School, Cleveland, which is said to be the largest high school in Ohio. Of course that school operates a foundry. Albert K. Fenne is instructor.

Many hands make light work

The Adventures of Bill

—by Pat Dwyer

ON A RECENT rainy afternoon Bill sprawled lazily in a chair in the garage and occasionally offered offensive technical advice on my method of playing the hose over the family chariot. I agreed that my technique was rather amateurish and generously suggested that he should finish the job in a proper manner. The cad refused. Instead of lending a hand he told me I should be thankful I did not have a boss prodding me along. As an after thought he claimed that any boss who tried to get any speed out of a snail had his full and unqualified sympathy. Through some obscure association of ideas he brought up the subject of rain water barrels.

"Do you remember," he inquired, "when every house had a rain barrel located at a strategic point to catch the maximum amount of water falling on the roof and then trickling down to the eaves? On the more pretentious houses a gutter under the eaves caught the entire supply and discharged into a vertical pipe leading to the barrel. Even where the barrel was provided with a cover, persistent and noxious types of insects crept in and deposited their loathly eggs, to be hatched out later as still more loathly forms of grubs and worms.

"Very interesting from an entomological standpoint, but apt to produce a certain feeling of nausea in any but the most hardened stomach. Horrible little squashy objects apparently bursting with pulp or other form of corruption may have been designed to fill some place in the universal plan of creation, but it is extremely doubtful if even a team of two strong evangelists, plus the advance agent, trombone soloist and choir leader could convince a housewife to that effect.

"Strong men contemplating the ablutionary pan of water dipped from one of these rain water barrels after a prolonged period of drought, have been known to clasp both hands over their stomachs, emit low, whimpering noises and gyrate slowly to a secret pocket in the hay mow or oat bin where a modest portion of snake bite remedy had been stored for an emergency.

"On the other hand, small boys armed with laths or other stirring implements have been known to lean over these barrels for hours, showing every evidence of innocent enjoyment. So what?"

Engaged for the moment in a highly intricate movement among the wheel spokes, I ignored this purely rhetorical question.

"Touching on this barrel question," he continued, "I saw some remarkable statistics the other day on (a) the annual production, and (b) the number in use. The total truly was impressive. Riffling idly among the pages I found an itemized breakdown according to the various industries. I also found a pronounced odor of a certain long tail rodent. Quick now! A three letter work figuring prominently in the argot of the under world."

Seems to be viewing with alarm

"You smelled a rat? Well, of course with a beak like yours—"

"Calmly ignoring the personal comment inspired purely by jealousy, our hero, the present speaker, no less, laid his evidence on the table. On the page devoted to the foundry industry I found that barrels were used for facing, for coal dust, for core compound, for crucibles, for ingots and nonferrous scrap and other purposes. At the end of the list—here's where I got a whiff of the rodent—our compiler had set down so many core barrels!

"Apparently the statistician had followed the usual procedure and sent a questionnaire to a selected list of foundries asking for the number, size and variety of barrels used during the year. Some foundry wag with the peculiar and perverted sense of humor characteristic of these low fellows included core barrels on the list. The compiler in his profound ignorance of everything but figures, naturally assumed that the barrels were used either for shipping cores in or out. Judging from the number on the list he must have got the dope from a soil pipe shop!"

"Statistics," I admitted, "invariably are dry and frequently misleading due to the utter impossibility of including every variable factor in any given compilation. Offhand, and basing an opinion merely on hearsay evidence over a period of many years, I should say that not more than one person in a thousand, that is one-tenth of one per cent, of the reading public is interested in statistics. In deference to the remaining 999 it would be idle to spec-

(*Continued on page* 56)

Ohio Ferro-Alloys Corporation
Canton, Ohio

(*Continued from page* 54)

ulate on the millions of barrels in use, in process of construction and in prospect.

"The one-tenth of one per cent can work out the problem for himself. In fact I am sure he would prefer to secure the information for himself in that manner when I hint that in the latest year for which American Iron & Steel institute figures are available, 42,697 tons of iron and steel were converted into barrel hoops. Assuming that the hoops on a barrel weigh so many pounds—Certainly my dear, one-tenth, certainly, just as you say. The problem is quite elementary."

"Maybe so," said Bill. "Maybe so. As an interesting side line in this here now research racket, a pleasant little digression down one of the shady bypaths, your statistician might determine the number of hours lost and the lineal inches of pencil wasted in figuring the weight of cement required for Boulder dam, or the output by states in any given period, say one calendar year. The joker in this little problem is that the calculation has to be based on the 94-pound sack and the 376-pound barrel as opposed to what it would be if the manufacturers used an ordinary common sense 100-pound sack or a 400-pound barrel.

"Rather surprising, to say the least, that up to the present none of the Comrades has directetd attention to this undeniably monopolistic gesture on the part of Big Business. Dirty work at the cross roads, me lad, when the decimal system is confined solely to the reckoning of money. Bad. Very bad. Mark the Comrade's words. Nothing good will come out of it. F'r instance look at this here now French revolution—

"Something also should be done—there should be a law or something—about the loose manner in which the word barrel is applied. As the situation stands now, when a person refers to a barrel, the party of the second part is as much in the dark as the drug clerk who was asked for a package of powder.

" 'Yes ma'am,' says he politely. 'Tooth, face, gun or bug?' "

"Go easy," I said, "you are getting into deep water. A barrel may mean one of many objects, but then the English language is peculiar. Pussyfooting school ma'ams, masculine, feminine and neuter, who profess to experience the most acute agony over a miss-spelled word, or a word that is not pronounced properly, invariably stiffen like a hunting dog when any person in the vicinity speaks of a *kag*. They do not experience the same stiffening effect, or a perceptible rise in temperature upon hearing the word kurnel, although one is no more a variation of the written word than the other. This is all the more difficult to understand when one reflects on the relative number of colonels and kegs in existence. Outside the ranks of enlisted men it is extremely doubtful if any person could distinguish between a colonel and any other officer at sight. Can any person say this about a keg? No, not by a kegfull.

"In passing one might touch lightly on the well known fact that the colonel's lady and Judy O'Grady are sisters under the skin. Merely a poetic rendering of the old bachelor's comment: 'They all look alike on a dark night with a bag over their head.'

"This would seem to dispose of the colonels and bring us back to the fact that every human being over the age of three is familiar with the word keg, either by actual contact, or through one of the other senses, sight, hearing, taste or smell. Confining ourselves for the moment to the English speaking section of the world's population, it may be divided roughly into two classes, the academic and the practical.

"Members of the first class have learned of kegs through hearsay or through the medium of the printed page. They call them kegs. Members of the second class, made up of those brought into contact with kegs, directly or indirectly, and therefore presumably on fairly intimate terms with this type of container, invariably refer to them as kags. A familiar example is the person temporarily abstaining from the use of intoxicating liquor. He boasts to all and sundry that he is *on the kag*.

"This connotation of strength, courage and masculinity with the rough and nasal *a* sound as opposed to the more refined *e* is a heritage of Scandinavian ancestry, of the virile, red blooded he-men who introduced beer and beer kags to Britain. In the early Scandinavian the word is cag; Iceland kaggi and Swedish kagg with a double *g*. Apparently the balance of proof is with those who say kag, even if they do compromise in their hand-'o-write and set the word down as keg.

"Any reference to strength and masculinity would be incomplete without touching, however briefly, on incidents in the career of the Nova Scotia giant McAskill and his sometime contemporary John L. Sullivan, the Boston strong boy. Rendered slightly peevish by the dilatory tactics of a schooner crew in unloading barrels of flour with a sling depending from the yard arm, the late Mr. McAskill jumped into the hold, caught up each barrel of flour in turn and tossed it up on the wharf as readily and apparently with as little effort as the ordinary person would exert in shying so many cocoanuts.

"In moments of exhiliration and probably with a view to securing a more rapid circulation of the flowing bowl, Mr. Sullivan was wont to knock in the head of an upright liquor barrel with one blow of his mighty fist. Then grasping the barrel firmly in both hand he raised it to his lips and quaffed the equivalent of one or maybe two beakers. Following this display of strength, agility and skill, he replaced the barrel on the floor, removed the surplus foam from the mustache with a skilfull application of the thumb, first and second fingers of either hand alternately, and then graciously invited the boys to help themselves.

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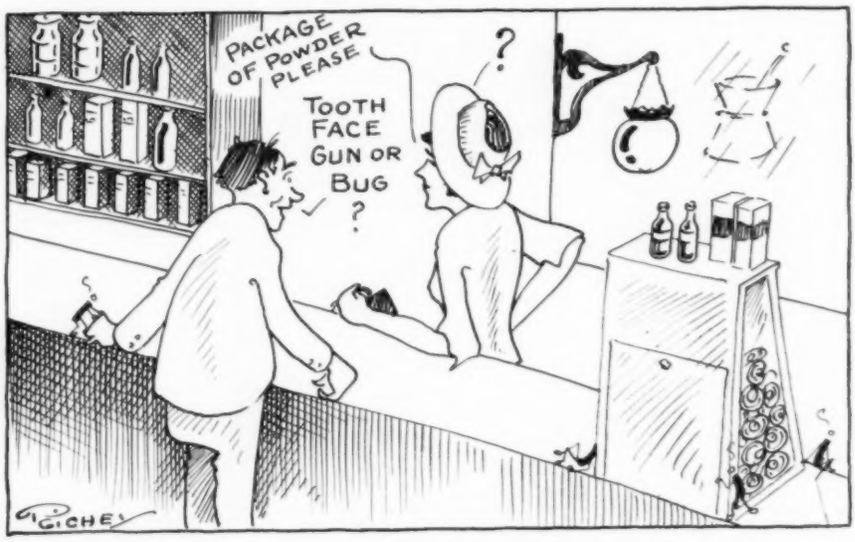

She probably is wondering where he got the perfectly ducky haircut

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cludes 10 years with the Taylor-Boggis Foundry, Cleveland, three of which were spent as foundry superintendent.

• • •

BENJAMIN RATHBUN has been elected president of the Chemung Foundry Corp., Elmira, N. Y., succeeding the late Frank G. Cornell. R. C. S. POTTER has been made vice president and treasurer, and P. E. STOTENBUR, is secretary. Directors of the company include S. G. H. Turner, Sydney Buckley and Messrs. Rathbun, Potter and Stotenbur.

• • •

GEORGE K. CONNELLY, Cleveland, again has become associated with the Domhoff & Joyce Co. in the coal sales department. Mr. Connelly entered the sales force of Domhoff & Joyce in 1914. After traveling out of the Cincinnati office as pig iron and coke salesman for 5 years, he was made resident manager of their St. Louis branch in 1919 and transferred to Cleveland in the same capacity in 1923. He left that organization in 1925 to establish a pig iron brokerage business, which now is being relinquished.

• • •

DR. JAMES T. MACKENZIE, metallurgist, American Cast Iron Pipe Co., Birmingham, Ala., will prepare the A. F. A. exchange paper for the 1938 meeting of the Institute of British Foundrymen. His subject will be "Chemical Changes of Cast Iron in Cupola Melting." In developing the paper, the author proposes to summarize the work which has been done by his company and correlate it with work accomplished elsewhere on carburization and other chemical changes which take place in a cupola, especially as affected by cupola operation, and the quality and physical characteristics of the coke.

Foundry Presents Service Pins

Farrel-Birmingham Co., Ansonia, Conn., recently presented service pins to 144 employes who had served the company for 25 years or more. Of the 114 present employes who received the pins, 44 have been with the company from 25 to 29 years; 23 from 30 to 34 years; 29 from 35 to 39 years; 10 from 40 to 44 years; two from 45 to 49 years, and six for 50 years or over.

Moves Office

Hickman, Williams & Co., pig iron, ferroalloys, coal and coke, have moved their New York offices from 30 East Forty-second street, to 300 Madison avenue, Room 902. Norman E. Craig is district manager.

Malleable Output

Malleable Founders' society, Cleveland, reports estimated production of malleable iron castings during the first half of 1937, of approximately 393,000 tons, which represents 73 per cent of capacity. This is an increase of about 67,000 tons, or 29 per cent, over the first half of 1936.

In 1936, a total of 56 per cent of the entire output of the malleable iron industry went into the production of automobiles and trucks. Approximately 150 pounds of malleable iron castings were used in the construction of the average automotive vehicle.

During the 10 year period of 1926-1936, castings devoted to miscellaneous uses rose from 30 per cent to 37 per cent of the total production. Numerous new uses and specialty developments have been largely responsible for this increase.

The discussion of industrial accidents and diseases at the 1936 convention of the International Association of Industrial Accidents Board Commission, held at Topeka, Kans. is published in a recent bulletin of the U. S. department of labor, division of labor standards. This bulletin may be secured from the superintendent of documents, Washington, for 20 cents.

Milwaukee Chapter of A. F. A. Holds Annual Outing

APPROXIMATELY 250 members and guests attended the annual outing and golf tournament held by the Milwaukee Chapter of the American Foundrymen's association at the Tripoli Country club. Golf occupying the afternoon was followed by a dinner and floor show in the evening. Officers of the chapter shown at the left from left to right are W. J. MacNeill, Federal Malleable Co., secretary; Walter Gerlinger, Walter Gerlinger Inc., chairman, and Roy M. Jacobs, Standard Brass Works, vice chairman

Reader's Comment

EDITOR'S NOTE—*Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of The Foundry or of Its Editors.*

Made in Metal

TO THE EDITORS:

I noticed a description of how to build a wood pattern on page 39 of the February, 1937 issue of THE FOUNDRY. It seems, according to the description, that a reader is having trouble with a pattern becoming distorted by the swelling of the wood. I cannot understand why any foundry should use wood for a job of this particular type.

If the job calls for only a few castings, it is perfectly satisfactory to build the pattern of wood. If this is done, I would suggest the use of the very best kiln dried lumber. A pattern made of such material should not cause any trouble where one or two castings are to be made. However, if the pattern is to be used for some time, then put in a pattern storage and later used again, the foundryman always will have trouble with such a casting leaving its regular shape. If the foundry has an irregular or large production, a job of this kind should be made of aluminum. That, in my estimation, would be the only satisfactory kind of pattern to make for that purpose.

VAUGHAN REID
President

City Pattern Works
Detroit

Rods in Arms

TO THE EDITOR:

In the *Question and Answer* section of the June issue of THE FOUNDRY I noted a reference to the cracking of wheel arms. In my experience I have found that a steel or iron rod, diameter in proportion to the size of the arm, placed in the mold will prevent the arm from cracking. This is common practice in steel foundries and is applicable in special cases in the gray iron foundry. A ⅜-inch diameter rod would be suitable for the wheel referred to in the question. The rod is supported on nails or chaplets in the center of the arm. A short toe at each end anchors it firmly in the hub and in the rim of the wheel. The usual precaution of course is observed by rapidly cooling the hub. Sand is stripped from the top and in extreme cases from the sides and the core is removed from the center.

P. CRUM

Sault Ste. Marie
Ontario.

Adventures of Bill

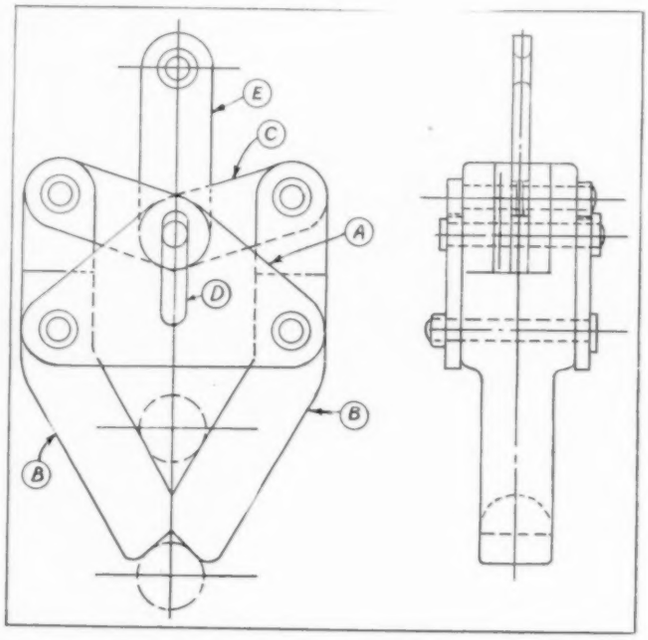
(*Concluded from page* 56)

"Furthermore and in addition, a Scottish friend assures me that the story is true. He says the news was flashed across the Atlantic and furnished Sir Walter Scott with inspiration for the opening lines in the Lady of the Lake: 'The stag at eve had drunk his fill' As a matter of fact the event occurred in Clancy's bar, but for patriotic reasons Walt switched the next line to read 'Where danced the moon on Mona's rill'."

"I don't know about your friend," said Bill, "but I should not be surprised to learn that the stag who supplied the information about the core barrels had also wet his feet in Mona's rill!"

Toggle Joint Type Crane Hook

A type of crane or suspension hook, that will not open so long as a load is suspended, is shown in the accompanying illustration. The assembly includes two triangular steel plates *A* to which are pivoted the two hinged jaws *B*. Toggle links *C* are hinged to the upper ends of the jaws. Connecting link *E* between the toggle links and the entire clamping assemly is maintained in alignment by a pin which slides up and down in the slot *D* in the plates *A*. The conecting link *E* may be connected to the crane-hook or elsewhere. In the operation of this device the link *E* is depressed which causes the jaws *B* to open. This allows the object to be lifted or suspended, to be inserted. The link *E* then is pulled which causes the jaws to come together with all the force exerted by the togggle link *C*. By replacing link *E* with a long hooked handle the device may be employed for suspending loads from I-beams or other structural shapes. The hook also is adaptable to trucks. It may be employed as a coupling hook, by backing of the link pin which slides in slot *D* into the link jaws.



The toggle arrangement at the top exerts a tremendous pressure on the points of the jaws

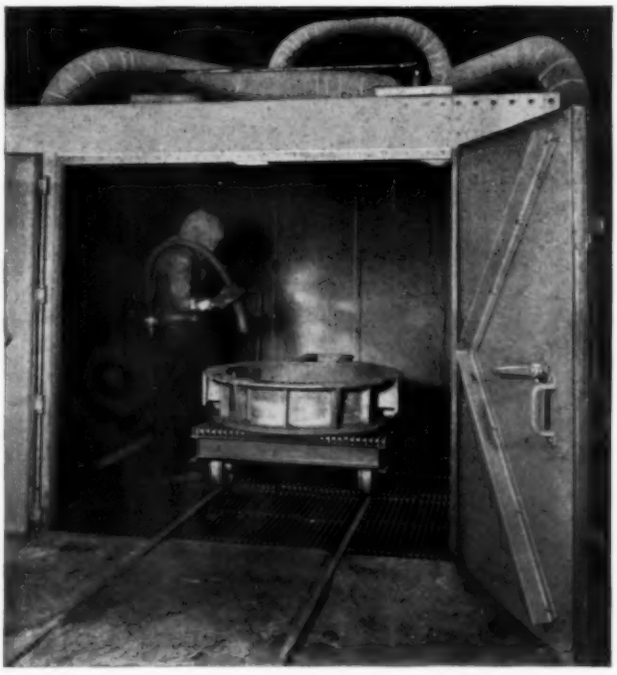
Book Review

Aluminum Alloys (Aluminium-legierungen), by A. Gruetzner, G. Apel and A. vonZeerleder, paper, 544 pages, 7 x 10 inches, published by Verlag Chemie, Berlin, Germany, and supplied by THE FOUNDRY, Cleveland, and in Europe by the Penton Publishing Co. Ltd., London.

This volume, which is in German, is Part 2 on aluminum alloy patents which forms a section of *Gmelin's Handbook of Inorganic Chemistry*, various volumes of which have been reviewed in these pages from time to time. The first part, which was reviewed in a previous issue, listed various aluminum alloys beginning with silver and ending with thallium. The present volume continues the listing starting with aluminum alloyed with titanium, and ending with zirconium. As in the previous cast the listing is alphabetical, beginning with the main element, and then the minor elements—for example, Ti, Ag-Ti, Au-Ti, etc.

In addition to the compositions information is presented in most cases on the physical properties as related to application or service, and on the source of the information. The volume also contains an extended list of trademarked aluminum alloys with data on manufacturer or inventor, and on compositions.

RUEMELIN BLAST CLEANING EQUIPMENT



Blast Room Installation, Built in convenient sizes.

Ruemelin Blast Cleaning equipment is sturdily built to withstand the severe operating service required by modern foundry methods. Our blast room design incorporates features that assure smooth, efficient operation of all working parts.

Blast machine valves, both air and abrasive, are provided with rubber seats for long life. Control levers are arranged for convenient operation. A patented blast control valve instantly stops or starts the machine for centralized control. Abrasive is automatically elevated and cleaned for re-use.

Information on the complete Ruemelin line of Rooms, Cabinets, Elevators, Blast Machines, Abrasive cleaners and accessories will be sent on request. Write for Bulletin 35.

RUEMELIN TUBULAR TYPE DUST FILTER

Ruemelin pioneered and patented many important features of the tubular bag type filter. Over a thousand are in successful service. They are extensively used in foundries to handle the dust from blast rooms, blast cabinets, tumbling mills and grinding wheels. Ruemelin filters have been designed to sustain the highest filtering efficiency. All inspections and replacements are conveniently made from the clean air side.

Send your next dust control problem to us for analysis. There is no obligation. Our quotation will include complete recommendations on dust filter, fan, motor, fan house, settling chamber, etc. Write for Bulletin 24-B.

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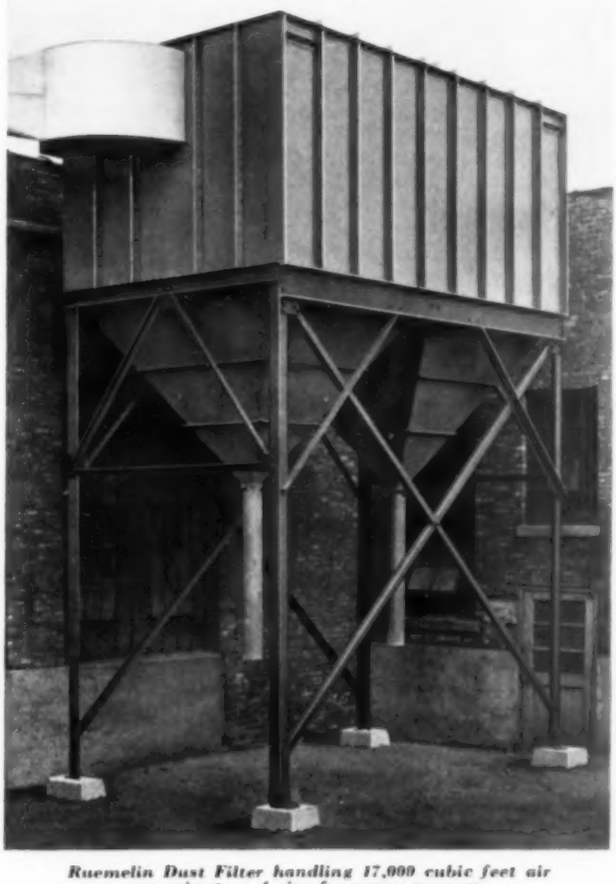


Ruemelin Dust Filter handling 17,000 cubic feet air per minute. A size for every purpose.

VIEWING FOUNDRY DEVELOPMENTS AT SHORT RANGE

CYLINDER liners for diesel engines built by a West Coast manufacturer are made from a nickel-chromium cast iron which averages 3.00 per cent total carbon, 1.65 per cent silicon, 0.75 per cent manganese, 1.50 per cent nickel, and 0.30 per cent chromium.

* * *

A new floor repair material supplied in powdered form for mixing with water is available for patching and resurfacing concrete, wood, tile, and brick floors. It is mixed to a thin consistency for priming the cleaned surface, and then in a dryer mix for troweling over the worn or broken area. The material can be brought to a feather edge. Setting takes place in 8 hours, and traffic can be run over the repaired area in 15 hours. It is claimed that the material does not shrink.

* * *

Use of the one-piece steam locomotive bed which now embodies integrally the component parts of the frame and cylinder structure, has since its introduction in 1924 been so extended that with very few exceptions it is now being applied to nearly all modern locomotives built in the United States, Canada and Australia.

* * *

A method has been developed in Germany whereby bearing brasses, particularly railroad brasses, formerly cast entirely of red brass, now are made of composite castings, steel and brass, with perfect union of the two metals, thus effecting a saving of up to 75 per cent brass. The process originally intended only for bearing brasses has been successfully applied in a modified form to the production of other metal parts, valve spindles and cock plugs. The composite casting of spindles, hitherto made of drawn brass, saves about 50 per cent of the brass. Union of the two metals forming the composite casting is so good that even when the casting is subjected to the greatest deformation or the connecting layer is removed in the lathe, the two metals cohere as if they consisted of a single material. It is claimed that stuffing boxes, glands, caps, rings and entire housings for cocks have been made by the method. Further it is claimed that equally good results have been obtained with steel, gray iron, or malleable iron as one metal and red brass or yellow brass as the other metal.

* * *

ONE manufacturer of hot air furnaces using alloy cast iron for various parts is advertising a written guarantee against burnout of firepot and grates within 20 years.

* * *

A producer of colloidal graphite mixtures mentions the use of that material suspended in water as a foundry parting compound, but probably refers to the application of graphite as a facing for molds and cores. The colloidal graphite is available in concentrated form, and before use is diluted with distilled water. Ordinary tap water may cause precipitation of the graphite.

* * *

A liquid coating which can be applied alone as a rust preventative, or as a priming coat under a final finish is available as a colorless compound. It is said to dry in 12 hours after application, and can be painted over after 72 hours. One gallon will cover from 800 to 1000 square feet of reasonably smooth surface. The compound is claimed to render rust inactive and to develop a water tight, air tight seal over the metal surface.

* * *

BENEFICIAL effects of molybdenum on the physical properties of malleable cast iron are indicated in the degree of twist obtained in wrench handles. One handle was twisted through 360 degrees without breaking while another was twisted through 450 degrees without breaking. The molybdenum content of the iron was 0.35 per cent.

* * *

Stock solutions of ferric chloride used for treating sludge in sewage disposal frequently play havoc with valves, injectors, spray nozzles, and other equipment, and it has been found that high nickel alloys containing approximately 58 per cent nickel, 14 per cent chromium, 17 per cent molybdenum, and 5 per cent tungsten possess a satisfactory resistance to corrosion of that nature.

* * *

New aluminum paint has been developed in ready mixed form which may be thinned with benzine or naphtha. It is claimed that the paint will not deteriorate with age, produces a smooth silvery finish, and will withstand temperatures up to 500 degrees Fahr.

* * *

A new aluminum solder has been developed which is claimed to be suitable for joining two pieces together or for filling holes or cracks in aluminum parts. It is applied with an iron of suitable size, or by a blowtorch. Preparation of the work only requires that it be clean.

ADVERTISING PAGES REMOVED

Book Review

Big Business, Its Growth and its Place, prepared for publication by Alfred L. Bernheim. 102 pages, cloth bound, published by the Twentieth Century Fund Inc., 330 West Forty-second street, New York, and supplied by THE FOUNDRY, Cleveland, for $1.35 and in Europe by the Penton Publishing Co. Ltd., London.

This book is the first of three volumes embodying the results of a study of large corporations and their place in American life, which was begun in August, 1934, by a special research staff under the direction of Rufus S. Tucker. It attempts to show how large big business bulks in comparison with the smaller concerns on the economic map as a whole, and the various sectors which represent specific industries and groups of industries.

The volume shows for example, that individuals and partnerships still carry on almost half of the country's total business. The reports are edited and presented as purely factual studies, as will be the two succeeding volumes. After their publication, a special committee will formulate a program of action to meet whatever problems the research reveals. The book contains nuumerous tables and charts illustrative of such chapter contents as: The growth and extent of incorporation; the rise of large corporations; concentration of operating units; and the concentration of corporate wealth.

Cash Budget

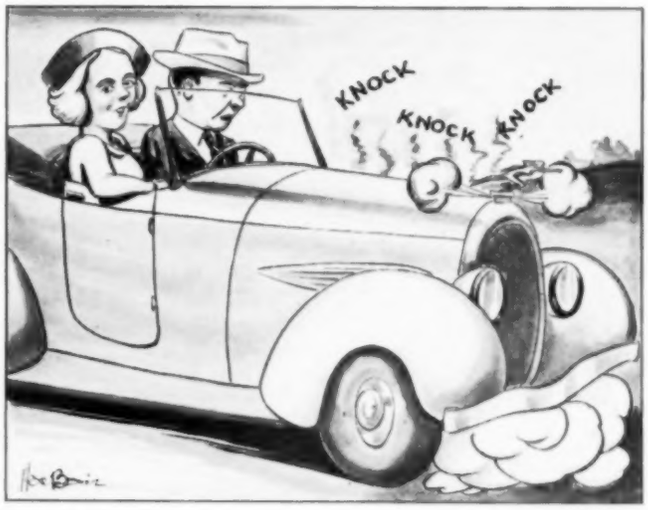
Results of a survey of practices of 45 companies in budgeting their cash requirements are presented in a booklet recently published by the Policyholders Service bureau, Metropolitan Life Insurance Co., 1 Madison Avenue, New York.

The survey disposes there is not necessarily any difference in the forecasting procedure in the large and small companies. However, the size of the concern often effects the degree of elaboration considered necessary in the cash budget. For example the procedure given for both large and small companies in illustrating one of the three forecasting methods followed by the companies reporting. These include (1) the receipts and disbursements method; (2) the adjusted income method; and (3) the working capital differentials method.

Health Protection

Industrial Health section, Metropolitan Life Insurance Co., 1 Madison avenue, New York, recently has published a report entitled "Health Protection of Welders," which gives a rather complete compilation of present day information on health hazards connected with welding operations. The booklet discusses types of welding and lists the four principal hazards encountered namely electric shock and burns; radiant energy, gases, fumes and dust; and miscellaneous which includes such hazards as possible exhaustion of oxygen in the air breathed due to pollution by products of combustion in confined, unventilated spaces. Methods of treatment also are considered.

Faked Foundry Facts



Hot Iron

Accident Statistics

National Safety Council, 20 North Wacker Drive, Chicago, has issued the 1937 edition of "Accident Facts," the annual compilation of the nation's accident experience. The text treats with statistics with all accidents and then gives details on the following divisions: Occupational, motor vehicle, transportation, railroads, aviation, public, and home.

Cutler-Hammer Inc., Milwaukee, recently has opened an office at 1106 Central Tower, Youngstown, O., in charge of E. J. Gove.

Aids Plant Survey

How valuable an instrument-conducted survey of plant electrical conditions may prove to be is exemplified by the findings of R. C. Hodges, electrical engineer, Titanium Pigment Co. Sayreville, N. J., who according to a report from the General Electric Co. recently made load tests on 800 motors in 40 of his company's departments.

Many motors, he found, were overloaded. For example, the same horsepower-size motor that was previously satisfactory on a low-speed pump had been put on a higher-speed pump of the same size. Other motors were found to be underloaded with resultant poor efficiency and low power-factor. In some cases motors were—or will be—interchanged; in other cases, replaced.

Mr. Hodges considers the data obtained in this survey valuable for two reasons. First, the findings help in keeping the plant running on its 7-day-a-week, 24-hour-a-day schedule by having the right motor for every job and accurate relay setting on the control. Second, the motor records have aided greatly in laying out the new equipment for a large plant extension. Much of this equipment is special, and accurate data were not available before the survey.

About 90 per cent of the tests were made without breaking circuits; yet only simple testing equipment was used—two ammeters, a voltmeter, a volt-ammeter, a recording ammeter, and two current transformers.

Besides using instruments for motor-load tests, Mr. Hodges also puts them to work frequently to check unusual conditions. For example, a motor driving a vacuum pump tripped out. Tests showed the motor was all right, the pump at fault. Again, when a transformer overloaded, a recorder traced the causes to a heater and a gang of electric ovens. In many instances, too, instruments are permanently installed on motors, such as on those driving agitators, enabling operators to keep mixtures at the proper consistencies.

Linde Air Products Co., unit of Union Carbide & Carbon Corp., New York, is constructing a large manufacturing plant at South Chicago, Ill., for the production of oxygen.

Makes Bronze Valves

(*Continued from page* 24)

rockwell *F* hardness of 68, and 25 per cent elongation. Metal for the trimmings contains a slightly lower amount of copper and tin, a trifle more lead and shows a corresponding reduction in physical properties. Metal for the stems is radically different: Copper 57.50 per cent, tin 0.50 per cent, lead 0.50 per cent, zinc 39.50 per cent, iron 1.50 per cent, manganese 0.10 per cent, aluminum 0.40 per cent. Percentage of elongation is decidedly lower than the others, but a marked increase is shown in the tensile strength, 55,000 pounds per square inch, and in the hardness, 90 on the rockwell *F* scale.

Other mixtures used extensively include a hard metal, a true bronze, copper 88 per cent, tin 12 per cent, a marine metal well known under the title government *M*. Government *G* metal contains 88.5 per cent copper, 9.5 per cent tin and 2.0 per cent zinc. Many castings for naval use and other purposes are made from monel metal and hard nickel alloys showing a brinell hardness number of 300.

To maintain the high standard of quality in the product, close technical control is exercised through a large and well equipped laboratory adjoining the foundry. All raw materials are bought to rigid specification and subjected to actual test before acceptance. Sand mixtures for molds and cores are checked periodically. At a station equipped with several pyrometers, in the vicinity of the furnaces every crucible filled with metal is halted temporarily for an attendant to check and record the temperature of the metal.

Experience gained over a period of many years indicates that a No. 90 crucible, that is a crucible which holds approximately 270 pounds of metal, is the most convenient size for use in this foundry. Standardizing on one size presents many advantages, including a uniform size in bails. The bail in this instance shown in Figs. 1 and 4 presents many interesting features and is a decided improvement on the type used in many nonferrous foundries. Flat prongs above and below the band hug the pot closely and thus help to distribute the weight. In addition they prevent the pot from wabbling, or from falling out of the ring while tilted at any angle between the vertical and horizontal. Extensions to the ring on diametrically opposite sides terminate in trunnions for attachment to the bail suspended from a light chain hoist. The trunnions are above the center of gravity when the pot is filled with metal, thus providing a factor of safety while the operator is pushing the pot from the furnace to any desired point on the molding floor. When in pouring position, a long lever attached to the back of the ring enables the pourer to guide and check the stream with the nicest degree of accuracy with one hand, while handling a skimmer with the other hand. An assistant travels with the pourer and manipulates the chain hoist. As may be noted in the two illustrations the pourer is equipped with goggles, apron, leggings and safety shoes.

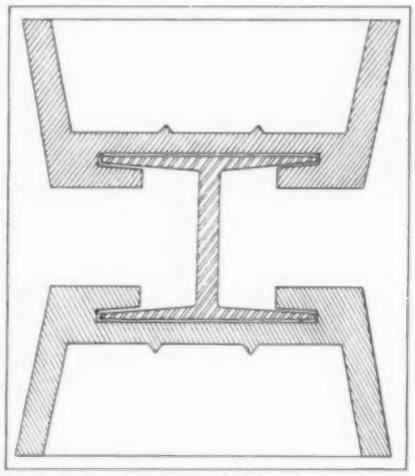


Fig. 8—Section not drawn to scale of the double, reversible battery of ingot molds. The cast iron molds are attached loosely to the steel I-beam

Small amounts of metal left in the crucible are poured into the double battery of ingot molds shown in Fig. 1. A sectional view of the molds, not drawn to scale, is shown in Fig. 8. After the upper row of molds is filled, the assembly is inverted by a wrench attached to the end of the center shaft and the second row of molds is brought into service. The assembly includes a pedestal at each end connected to each other by a suitable length of steel I-beam. A trunnion at each end of the I-beam rests in a bearing on top of the pedestal. Each mold is provided with a short horizontal slot on the bottom at each end. These slots embrace the flange of the I-beam and thus are held firmly in position, irrespective of whether they are on the top or on the bottom. A short piece of angle iron bolted to the beam at the end prevents any end movement of the molds. When a mold is broken or becomes worn in service, the angle iron may be removed temporarily, while the mold is being removed and replaced by a new one. On regular production work the amount of metal in each crucible is calculated so nicely that none or very little remains to be poured into these ingot molds.

Causes Slight Drying

Several interesting features in connection with the molding methods practiced in this foundry are shown in Fig. 2. The white deposit is flour. A slight amount from a bag is dusted over the face of the mold in the cope and drag. The flour through a slight absorption of moisture imparts a slight skin drying effect and later, in burning, develops a protective gas which produces a clean surface on the castings. The bench in the vicinity of each molding machine holds the tools and other pieces of equipment including a wood box in which the cores are carried from the core room. One piece metal copes and drags are employed exclusively. It is claimed that a greater degree of accuracy in shape and weight of castings is secured than in molds made in snap flasks. The flasks are interchangeable and detachable pins are employed in closing the cope on the drag.

A section of the pattern storage is shown in Fig. 9, indicating the method of storing patterns by a system of numbers and letters and also indi-

(*Concluded on page* 68)

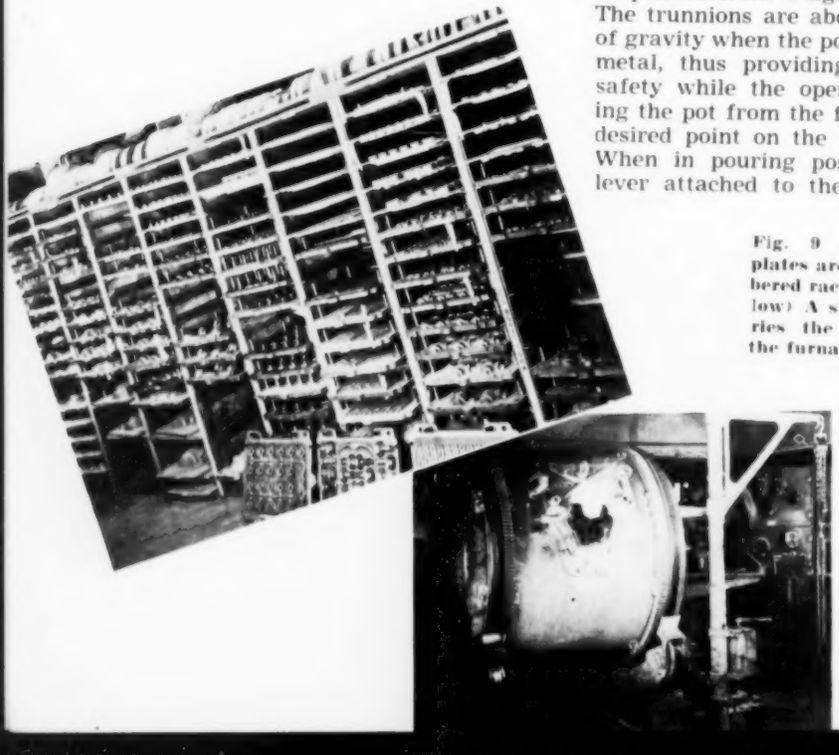
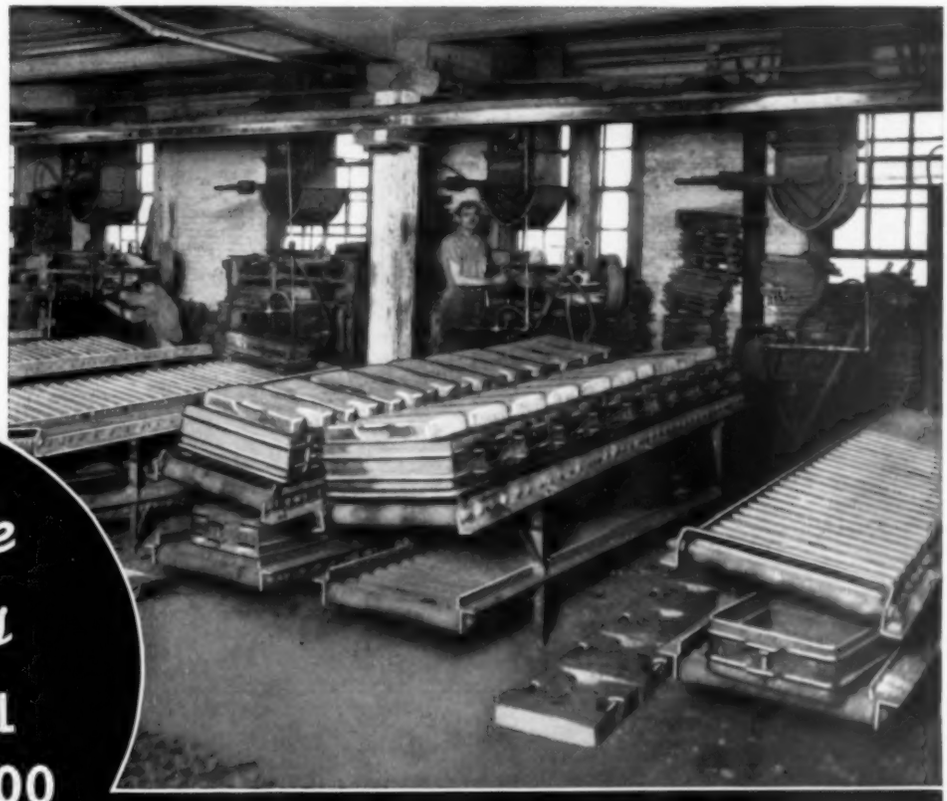


Fig. 9 (Left) Pattern plates are stored in numbered racks. Fig. 10 (Below) A small buggy carries the crucible under the furnace to receive the metal



Definite Savings FOR SMALL FOUNDRIES TOO

THERE'S NOTHING LIKE *Bartlett-Snow Equipment* FOR EFFICIENCY, SATISFACTORY SERVICE AND LOW COST OPERATION

BARTLETT-SNOW FLASK FILLER . . . one of a complete line that includes swiveled chute, pivoting boom and single, double and triple, flat and sloped, apron feeder types.

BULLETIN No. 75. Complete with 120 illustrations and 26 engineering diagrams, this 44-page booklet describes the Bartlett-Snow method of securing less costly; more efficient operation. Send for one!

• Bartlett-Snow equipment for small foundries secures the greatest possible output from the same or smaller floor space—in shorter time—with fewer rejections and at lowest possible cost. In some cases a revolving screen and tempering belt, aerator and seasoning bin suffices. In others, overhead sand return to molder's hoppers is preferred. It permits tremendous increases in production and a cleaner, more orderly—and more profitable operation—than would otherwise be possible.

Let us show you what various arrangements of Bartlett-Snow sand-handling and sand-conditioning equipment are doing in cutting costs for small, continuous production and jobbing, brass, aluminum, steel, malleable and grey iron foundries . . . and the savings they can make for you. The investment in equipment need not be large. What are your foundry problems?

THE C. O. BARTLETT & SNOW COMPANY

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BARTLETT·SNOW

SAND HANDLING AND SAND CONDITIONING EQUIPMENT
MOLD CONVEYORS AND ACCESSORY FOUNDRY EQUIPMENT

(*Concluded from page* 66)

cating the almost infinite range in sizes and styles of valve parts. The bronze pattern parts are mounted on substantial cast iron plates. In the majority of instances the patterns are symmetrical and therefore by a suitable distribution of parts on one side of the plate, a single plate serves for making both cope and drag.

With the exception of the larger sizes, special shapes and odd lots, all the cores are made on a battery of core blowing machines supplied by Wm. Demmler & Bros., Kewanee, Ill. In these machines, sand from a magazine on top is blown by compressed air into a corebox held in clamps on the table. Owing to the irregular contour, dryer shells are required to support the cores on their journey to, and during the baking period in the ovens. The dryers are loaded on pneumatic tired buggies to minimize vibration in transit. A typical core-making station is shown in Fig. 5. Cores are dried in a number of drawertype ovens as shown in Fig 6, made by the Foundry Equipment Co., Cleveland. A firing chamber between each pair of ovens supplies the necessary heat for drying the cores. After the cores are dried they are inspected and—where necessary—pasted and assembled by a crew of expert young women as shown in Fig. 7. The completed cores as shown in Fig. 8 are placed in storage racks and from there are distributed as required to the various molding floors in the foundry.

Analyses and Physical Properties Valve Parts

Casting	Copper	Tin	Lead	Zinc	Iron	Man-ganese	Alumi-num	Tensile stgth. p.s.i.	Rockwell F Hard-ness	Elon-gation per cent
Bodies	87.50	4.50	2.75	5.25	....	....	....	35,000	68	25.00
Trimmings	86.00	4.25	4.50	5.25	....	....	....	32,000	66	20.00
Stems	57.50	0.50	0.50	39.50	1.50	0.10	0.40	55,000	90	15.00

Molding Was An Art

(*Concluded from page* 31)

that he will not contract matrimony within the said term—that he will not play at cards, dice or any other unlawful games, whereby his master may be injured—that he will neither buy nor sell, with his own goods nor the goods of others, without license from his master—and that he will not absent himself day nor night from his master's service, without his leave—nor haunt ale-houses, taverns or playhouses, but in all things behave himself as a faithful Apprentice ought to do, during the said term. And the said master on his part doth covenant and promise, that he will use the utmost of his endeavours to teach or cause to be taught or instructed, the said Apprentice in the art, trade or mystery of Iron Molding and will procure and provide for him sufficient meat, drink, lodging and washing fitting for an apprentice, during the said term, and will give him in lieu of clothing three dollars in every four weeks during said term.

And for the true performance of all and singular the covenants and agreements aforesaid, the said parties bind themselves each unto the other, firmly by these presents. IN WITNESS whereof, the said parties have interchangeably set their hands and seals hereunto. Dated the Sixth day of March in the year of our Lord one thousand eight hundred and thirty six.

Sealed and delivered before me the Subscriber

Benj. Hutchinson
Alderman
Archibald H. Maxwell
Anthony Davis
James H. Maxwell

In one respect the document constitutes a rather interesting commentary on the changed conditions between employer and employe. At present the problem is to present sufficient inducement to persuade boys to enter the foundry. One hundred years ago the employer dictated his own arbitrary terms on the basis that he was doing the boy a favor in allowing him to work. Some of the terms of course are in accordance with common honesty, fair dealing and elemental justice, the tenets of which do not change from generation to generation.

Under present day conditions the prospective apprentice might be inclined to balk for example at the clause forbidding him to contract matrimony, to play at cards or dice, or that he will not absent himself day or night from his master's service without leave. As for haunting alehouses, taverns and playhouses, it is conceivable that the boy might consider this a feature to be left to his own discretion. Incidentally one is moved to wonder why this clause was inserted. A boy could not haunt alehouses, taverns and playhouses to any demoralizing extent on a wage of $3 in every four weeks!

British Institute To Meet

The autumn meeting of the British Iron and Steel institute will be held in Middlesborough, Yorkshire, from Sept. 14 to 17. A program of technical meetings, works visits, excursions and entertainments has been arranged.

Leon Guillet, member of the French Academy of Science, director of Ecole Centrale des Arts et Manufactures, and professor at the Conservatoire des Arts et Metiers, Paris, has been nominated an honorary vice-president of the institute, and Dr. C. A. Edwards, principal of University college, Swansea, Wales, has been elected a member of council.

Hints for Brass Shop Practice

(*Concluded from page* 30)

mating of the mold parts. All must be watched most carefully if the best product is desired. Since nonferrous castings are expensive by reason of the metals therein, rejection of them is bound to be expensive also.

These alloys shrink somewhat more than gray iron. Fillets at the junction of thick and thin sections always must be liberal. The nonferrous foundryman who accepts patterns from his customers without adequate fillets is taking a chance he is likely to regret. Before placing these patterns in the sand he should ask permission to increase the fillets.

This is the first of two articles by Mr. Patch to appear under the heading "Hints on Brass Shop Practice." The second will appear in the September issue.

The Editors

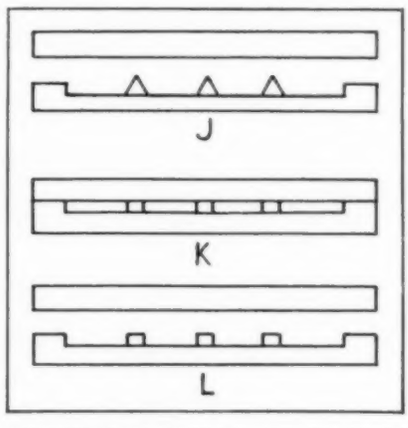

Fig. 4—Three steps in application of dough balls to gage thickness. Above, balls are placed in open mold. Center, mold closed. Below, mold open for inspection and measurement

WHAT CAN I DO TO MAKE THEM THINK?

By Robert F. Heller †

What executive hasn't asked himself that question over and over again? Your business could forge ahead more rapidly if you could get more of your employes to do a thinking job — but how? The five steps outlined in this article supply the answer that all business is seeking today!

WHEN an employe sticks his head in the door and asks a question that one second of thought would have answered for him, does it "burn you up"?

When a man in the machine shop "gums" the works on an important job because he "didn't know", do you see red?

When you have to spend all your time thinking out shop problems or finding short cuts, are you doing your job or someone else's?

The day when one or two men can do all the thinking for an organization has definitely passed. Business has grown too complex, too intricate, for the heads of a business to be able to do the thinking on every individual operation throughout the plant. Important phases of management, selling and finance may command the bulk of your business hours. The thinking you are doing is along broad creative lines. You are the architect building a business; your key employes are the contractors and subcontractors.

Yet, one idea from an employe — one well thought-out suggestion—may profitably improve the whole design of your business structure. How can you get these men to offer ideas and suggestions? How can you make them think?

Have you ever stopped to analyze what makes you think and what has influenced the new ideas you have developed for your firm during the past 10, 15 or 25 years?

Suppose in all that time you had never seen a business paper, had never read an article related to your business, never analyzed your production setup in comparison with others described from time to time, never picked up a short cut or money-saving idea from a trade paper, and never had looked at a helpful piece of direct mail advertising. In short, suppose during your entire business career you had never done any reading related to your business. How do you suppose it would have affected your thinking?

Would your plant and methods be as modern as they are right now? Would you know all the things you know today if you had not done your share of reading during those years of building?

The answer is obvious. Reading does exercise a powerful influence on our thinking. It stimulates us from outside of ourselves. It pours ideas into our minds that tumble around and take shape, to our benefit and profit. It spurs us on, shows us new and easier ways of doing things and encourages us to think and apply the things we read.

What's sauce for the goose is sauce for the gander, yet how many of your key men realize, as you do, the importance of reading publications that deal with your business and their jobs?

Would you really like to know? Then take time out to make a little survey. Ask each key man, right down to your foremen, about his reading habits. Find out what business papers

†Beaumont, Heller & Sperling, Inc.—Reading, Pa.

he subscribes to, and also, what papers he *reads* on company subscriptions. If you are successful in getting frank, honest answers, you will probably find that reading and progress and efficiency go hand in hand.

"What can I do to make them think?"

It's one of the most vital questions that any executive can ask himself. The answer will help him to multiply his own efforts down through his supervisory force.

There are five steps that you can take to bring about more original thinking in your organization:

1. Cut the red tape. In many industrial organizations today are actual barriers that prevent key men from receiving business publications, direct mail literature and sales information. Intentionally or unintentionally, these barriers of red tape discourage circulation-building efforts of trade publications, as well as the distribution of information through the mail. Unless the men can be exposed to this type of material, how can you expect them to be bitten by the bug of a new idea?

So cut the red tape. Many progressive firms have already done this. When the names of certain individuals are requested for legitimate mailing lists, give them gladly. It won't hurt you; it will help you. When a worthwhile business paper which is sincerely trying to do a helpful job for industry endeavors to win some circulation in your plant, remember you reap the harvest from the seeds they plant.

2. Encourage the reading of business papers. Talk with your men individually about the paper or papers they should be reading to help them do a better job. You can't *drive* them to it, but you can *lead* them to it by showing them how it will help them to get ahead. Encourage them to subscribe for some good publication and have it sent to their homes. A man will be much more likely to become a thorough reader if he gets a magazine at home. Then, too, an individual subscription gives a man a feeling of importance and this stimulates his thinking to justify that feeling. Above all, try to dispel the guilty feeling which many a man still has if the boss walks in when he has a business paper open on his desk. Far better to have him exposed to new ideas than sweating away at his job eight hours a day with no time to think how his department could be improved.

3. See that business papers circulate and are read. It is, of course, impossible for each individual to subscribe to all the business magazines he should see, so it is necessary to fall back on the "check and pass on" system. Too often, however, it becomes just that—with the readership practically nil. One executive solves this by asking questions of his supervisory force at meetings concerning articles appearing in current issues of these circulated publications. It keeps the men on their toes and gets the publications read.

4. Ask for suggestions. Many firms employ the suggestion box with considerable success. The bait is sometimes recognition in the company magazine, a cash prize or a bonus based on the value of the idea to the firm. This is always a strong incentive to creative thinking. A man can visualize how he can profit and, don't forget, his reading will help to make his suggestions more worthwhile.

5. Send them visiting. There is nothing to equal a trip to another plant for starting the old idea mill working. Send your men visiting once in a while and they will come back with new enthusiasm and a keener appetite for their jobs. Don't neglect the opportunity that trade-shows and expositions offer to bring your men in contact with new ideas and new equipment.

There are many other things you can do, of course, to get your men to think, but these five suggestions give you a concrete program that can be made to pay dividends.

Start the ball rolling now by checking the magazine readership in your plant. Get your men exposed to more reading for more thinking.

The story is told of a company executive who called in an advisory expert to solve a certain production problem. The answer was given promptly, and the executive readily paid $1,000. Later, the expert laughingly told a friend that he had secured the information that provided the answer from a certain business paper and that the particular issue containing this information was lying (unread) on the executive's desk at the time of the interview.

Opens New Foundry

(*Concluded from page 34*)

apparatus that may be designed and built for special research problems.

Two 35 kilovolt-ampere oscillator type, high frequency induction furnaces, with provision for vacuum and controlled atmosphere melting are placed along the opposite wall, where a 500 pound, low frequency induction furnace, and a 500 pound indirect arc rocking furnace are

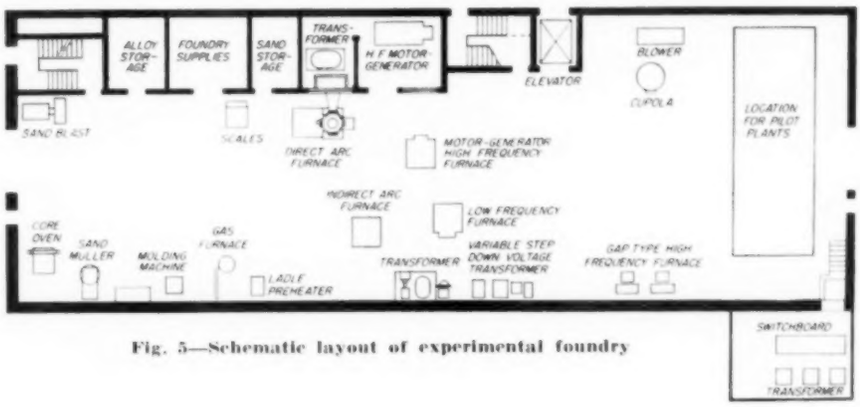

Fig. 5—Schematic layout of experimental foundry

also located. Excess transformer capacity has been provided for these furnaces to accommodate additional melting units. Two gas fired crucible furnaces and standard sand handling equipment, a core oven and molding stands complete the installation. Offices for the metallurgical staff and individual laboratories are located on the fourth floor of the new building.

In addition to the metallurgical laboratories the institute is equipped with special laboratories for the study of molding sands, refractories and ceramic products, and for the investigation of problems in fuel technology, the treatment of ores and coals and in applied chemistry and physics.

Operations of the foundry research laboratory are under the direct supervision of C. H. Lorig and C. E. Sims, both of whom are well known to the foundry industry. Dr. H. W. Gillett is chief technical advisor. The technical staff has been built carefully to include men of mature training in every phase of foundry operation. Specialists in physical testing, electrical measurements and chemical analysis are available for assistance on foundry problems. Investigations of refractories, fuels or other problems related to the foundry industry are carried on in other divisions of the institute. Steady growth of Battelle Memorial institute under the able guidance of Clyde E. Williams, director, is a tribute to Gordon Battelle, who many years ago foresaw the value of scientific research to industry and endowed the institute to furnish this service.

Discuss Silicosis In Report

A six-point program for protecting the health of industrial workers, and a definite plan of medical research designed to help curb industrial disease is recommended to the Air Hygiene foundation, Pittsburgh, by its medical committee to report on "Silicosis and Allied Disorders."

The committee headed by Dr. A. J. Lanza, chairman, has attempted to bring together for the first time a practical summary of what is known and what remains to be learned about silicosis. Members of the medical committee are: Dr. Leroy U. Gardner, Saranac Laboratory, Saranac, N. Y.; Dr. S. R. Haythorn, Singer Memorial Laboratory, Pittsburgh; Dr. T. Lyle Hazlett, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; Dr. R. R. Jones, Bell Telephone Co., Pittsburgh; Dr. E. P. Pendergrass, University Hospital, Philadelphia; Dr. O. A. Sander, consultant, Milwaukee; and Dr. R. R. Sayers, U. S. public health service, Washington. Miss Eleanor Rantoul, research assistant, Industrial Health section, Metropolitan Life Insurance Co. also assisted.

The report recommends the practical program of pre-employment examination of all workers exposed to dust containing silica. Such examinations should include a complete physical examination of each individual, a careful history of past occupational exposure to dust and a chest roentgenogram.

Book Review

Elementary Foundry Technology, edited by L. A. Hartley; second edition by Edwin Bremer and Pat Dwyer, metallurgical and engineering editor respectively, THE FOUNDRY; 375 pages, 6 x 9 inches, cloth; published by the Penton Publishing Co., Cleveland, and supplied by THE FOUNDRY, Cleveland, for $3, and in Europe by the Penton Publishing Co. Ltd., London, England.

This text on elementary foundry technology with special reference to gray iron and steel, designed to serve the foundry in schools and in industry, conforms to the requirements for instruction as set up in the minimum standards of four year foundry apprenticeship in the United States. Co-ordination of material from different fields has been well balanced to meet the need of vocational schools and of practical foundrymen in the shop.

Subject matter selected from elementary physics and chemistry is broad enough in scope to furnish a foundation for the contributions of the technical experts. The text is plain and simple. A young student, with only a little knowledge of chemistry, readily will understand the applications presented. A list of questions which follows each chapter has been designed to test the foundry knowledge and reasoning power of the student, rather than his ability to memorize the text.

General impression of the field covered may be gathered from the following list of main divisions: Substances and their structure; physical properties; oxidation; reduction and combustion; force and motion; application of force; mechanics of fluids; effects of elements on iron; iron; melting devices; foundry sands; the steel foundry; crucible, bessemer, open hearth, electric; molding machines; permanent molds; gates and risers. A glossary, index and bibliography add considerably to its value as a text book. The book has been completely re-edited, revised and enlarged to a considerable extent by the addition of new material. The book is sponsored by the National Founders association, Chicago.

Heat Fusion

Bulletin No. 393 which constitutes Part V of "Contributions to the Data on Theoretical Metallurgy" recently has been published by the bureau of mines, department of the interior, Washington. The bulletin relates to the heat of fusion of inorganic substances and was prepared by K. K. Kelley. Copies of Bulletin No. 393 may be obtained from the superintendent of documents, Washington, for 20 cents.

Refining Iron in Ladles

(*Continued from page* 27)

to the cupola melting rate, formerly required for complete refining. With the standard type teapot ladle or forehearth, a bath of iron equal to one-third to one-sixth the hourly melting rate generally was needed to insure against slag going out with

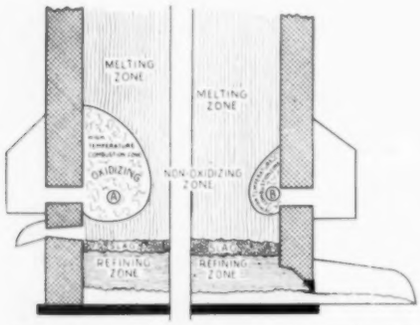

Fig. 5—Presence of soda ash limits the zone of free oxygen to a small high temperature at the tuyeres

the refined iron. Objections largely have been overcome by the development of the new elongated teapot mixer ladles. This type of ladle, which may be *U*-shaped or cylindrical, when covered and insulated, reduces the temperature loss in the mixer to about one-third of that resulting in ordinary teapot ladles and furthermore, requires a much smaller volume of metal for complete refining. These ladles have extended the advantages of a mixer and desulphurizing to foundries making the lightest class of castings and with melting rates as low as 2 to 3 tons per hour.

In the elongated ladles, boiling of the metal is limited to one end where the iron and soda ash enter, as shown in the diagrammatic illustration Fig. 3. The metal quiets down, with separation of the slag as it travels through the ladle. The spent slag is drawn off at the surface opposite the teapot spout. Generally speaking, 25 to 30 per cent of sulphur in the iron at the cupola spout can be removed from metal for pouring light castings. In metal for pouring heavy castings, where the iron can be poured at lower temperatures, sulphur can be reduced 50 to 60 per cent.

Capacity of the ladle may vary widely for the same diameter cupola, depending upon the class of work and the extent of desulphurizing desired. For refining light castings, the ladle should have a working capacity of one-tenth to one-sixth the hourly melting rate, thus holding the iron in the ladle in contact with the desulphurizing slag for from 6 to 10 minutes. For heavy castings the capacity may vary from one-fifth to one-third the hourly melting rate, thus providing an elapsed time of 12 to 20 minutes in the ladle.

Continuous flow of iron into the mixer ladle generally is recommended, although the mixer can be operated with intermittent tapping. In either case, an active desulphurizing slag is maintained on the ladle throughout the duration of the heat. This is done by timing additions of the soda ash in relation to the hourly melting rate and slagging off a portion of the spent slag at regular intervals. The ladle is maintained half-full or better during the heat. Iron for pouring castings is drawn off at the bottom. The desulphurizing slag is kept flowing across the ladle by pouring off a little slag just before each transfer ladle is filled as each charge of soda ash is added at the opposite end of the ladle. Additions to the ladle are stopped 10 or 15 minutes before the last iron comes from the cupola. The head of slag in the ladle generally is sufficient to desulphurize the last iron. The ladle is slagged off clean by tilting backward just before pouring the last iron. The last slag and any iron remaining in the neck of the teapot spout are drained off by tilting the ladle over backward after which it is uprighted and the night cover put on and sealed to hold the heat in the lining overnight.

Use of 2 pounds of soda ash in the cupola per ton of metal charge is valuable when melting high scrap mixtures and desulphurizing in the ladle. This small quantity serves to improve melting conditions and reduce oxidation of the metal by the blast. A more fluid slag keeps the bed coke clean, thus accelerating deoxidation by the incandescent bed coke and promoting maximum carbon pick-up in the hearth of the cupola. Soda slags rise out of the iron more readily which makes for more efficient desulphurizing later on in the ladle.

The total quantity of soda ash to be used per ton of iron generally should be divided between the cupola charge and the mixer refining ladle. The quantities required per ton of metal for best results will vary with different conditions and must be worked out by trial at each plant. Aside from any saving in cost, the best results generally will come with the use of the minimum quantity per ton of metal that is found to produce a clean, soft fracture, irrespective of the sulphur content of the finished casting.

When starting, the mixer ladle should be used without any mixture changes for one or two days, until the operators become familiar with its use. Toward the middle of the first heat, one pig of soda ash per ton of metal should be added in the ladle and continued at this rate to the end of the cast to determine its effect upon the iron. On the second day, one pig per ton is added throughout the heat. Thereafter the quantity is increased with each increase in the scrap charge, or to 2, 3 or 4 pigs per ton as required to hold the sulphur at the desired point. The pigs average approximately 2 pounds in weight and the quantity used per ton can be regulated in one of three ways:

First, by adding one or more pigs every 3, 5 or 10 minutes, etc; second, by adding one or more pigs for each cupola charge, the charger signaling the ladle operator by a light or bell as each charge goes into the cupola; third, by regulating in relation to the number of ladles of iron

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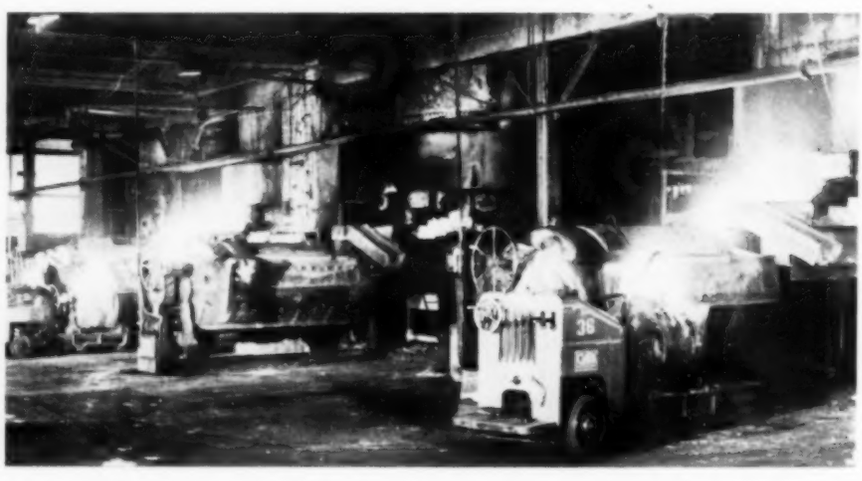


Fig. 6—Battery of four 8-ton power driven cylindrical teapot mixer ladles. Type of construction recommended for ladles of 10 tons and over capacity. For smaller ladles the U-shape is more easily lined and maintained

Increasing the life of forging dies

DIE renewal is always a factor in the production cost of forged parts. And when actual instances appear showing die expense being slashed and not just shaved, the subject becomes one of major importance.

Our records hold a recent case example in which die blocks from a former material lasted only a week to ten days. Blocks containing .20-.30 carbon, 3.5 nickel and .35 Moly lasted three months.

Since Moly greatly increases steel's resistance to sudden heat impact, it quite naturally adds to the life of forging dies and thus substantially cuts down production costs.

Our technical book, "Molybdenum," will prove useful to engineers and production heads interested in cost cutting and product improvement. Our monthly news-sheet, "The Moly Matrix," keeps its readers informed on Moly developments. Both sent free on request. Our laboratory is available for the study of special ferrous problems. Climax Molybdenum Co., 500 Fifth Ave., New York.

PRODUCERS OF FERRO-MOLYBDENUM, CALCIUM MOLYBDATE AND MOLYBDENUM TRIOXIDE

Climax Mo-lyb-den-um Company

MOLY

(*Concluded from page* 72)

taken away. The latter method would apply only with uniform capacity ladles. The first soda ash charge is not added until after the iron in the mixer has completely covered the teapot spout. Then twice the regular amount used per ton is added to give a head of slag. After the ladle is filled to capacity and pouring starts, additions are made at regular intervals and the slag is kept flowing across the ladle.

The pigs show a tendency to absorb surface moisture, especially during damp weather, and unless first dried off may cause a *pop* when added to the ladle, although there is no danger of an explosion. They can be dried off by placing a bag in the core oven overnight or by otherwise storing in a dry place before use. With the new elongated ladles the pigs sometimes are fed into the ladle by placing them end to end in the channel on the cover. As each pig is placed in the channel it kicks one pig over into the ladle at the opposite end.

When increasing the percentage of scrap in the charge usually it is good practice to figure both silicon and manganese points increasingly higher as the total scrap is increased. This precaution is recommended, at least at the start, to compensate for any possible lowering of total carbon which may result when melting high-scrap mixtures, and when changing over to continuous front-slagging operations. After the system has been running awhile and the carbon pick-up and fluidity of the iron have been determined in practice, either silicon or manganese, or both, gradually may be lowered. sometimes below that formerly carried in the original mixture.

Where the original mixture carries 10 per cent or more of steel scrap generally it is found desirable gradually to reduce the steel as the total percentage of scrap is increased. The combined effect of increased scrap and the refining tends to close up the grain structure as well as to increase strength and at the same time improve machinability of the finished iron castings.

Elongated teapot mixer ladles, varying in sizes from as low as 600 pounds to 10 tons capacity, are in regular use today, with universally satisfactory results with the desulphurizing. As seen in the table of capacities, Fig. 4, these elongated type ladles require minimum headroom for a given capacity and the capacity may be varied for any given headroom by varying the length of the ladle. Experience has shown that with a little ingenuity this type of ladle generally can be worked into almost any cupola headroom conditions and generally can be put into regular operation with a minimum loss of time and in many cases without interrupting production even for one day's cast.

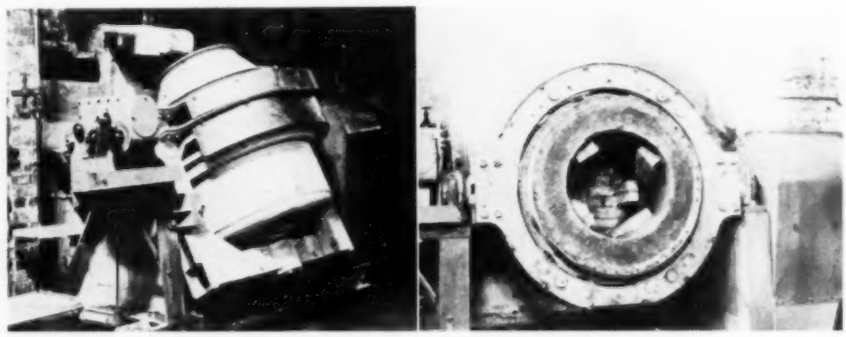


Fig. 7—Revolving mixer refining ladle. (Left) In tapping position ready to receive charge from the cupola. (Right) Inside view showing projections built into the lining to promote stirring as the ladle is revolved

Book Review

Science Training for Metal & Wood Trades, by William H. Dooley, cloth, 551 pages, 5⅜ x 8 inches, published by Ronald Press Co., New York, and supplied by THE FOUNDRY, Cleveland, for $2.40, and in Europe by the Penton Publishing Co. Ltd., London.

This book is the revised edition of *Applied Science for Metal and Wood Workers* which appeared in 1923. It is written primarily for vocational teaching to give the student a practical concept of various sciences which generally are taught in a more or less abstract form in the regular high school. The book contains 44 chapters dealing in a brief, concise manner with a wide variety of subjects involving chemistry, physics, electricity, strength of materials, power, iron and steel, machine shop practice, tools, sheet metals, etc.

Of particular interest to the foundry industry are several chapters relating to its field wherein it will learn some startling facts. It is regrettable that the author did not have the particular chapters in question checked by some competent individual. Some of the errors are by implication rather than direct statement—for example reference to use of burned or dirty iron in the cupola requires the employment of flux; iron castings taken from the mold present a rough surface and must be cleaned and smoothed; removal of scale by pickling, etc.

Gray iron foundrymen will be glad to know that cast iron has an average strength of 7 tons per square inch, but may vary from 5 tons to 19 tons per square inch. Steel foundrymen likewise will be surprised to learn that large steel castings are made by charging the furnace with pig iron scrap, steel and broken ingots molds, and the disadvantage of that process is that the castings are not perfectly sound because of pores or blow-holes below the surface of the metal which cannot be seen. Those are but a few of the numerous inaccuracies present. If a future edition is contemplated, careful checking of material should be in order.

Mixture Composition and Analysis

(Four Plants Making Standard Radiator Sections)

Cupola Charge	Plant A	B	C	D
Pig iron	17.5%	.....	6%	10%
Scrap and returns	82.5%	94%	88%	85%
8-10% silvery	.....	6%	6%	5%
Metal at Cupola Spout				
Sulphur — average	.146%	.177%	.163%	.160%
Heat Analysis — Average				
Silicon	2.21%	2.27%	2.35%	2.31%
Manganese	.61%	.62%	.56%	.58%
Phosphorous	.61%	.43%	.46%	.44%
Sulphur	.12%	.103%	.095%	.105%
Total carbon	3.48%	3.27%	3.36%	3.49%

Desulphurized with 4 to 8 pounds of purite per ton.

Ohio Steel Foundry Co. employes, Springfield, O., were shown motion pictures of the safety precautions exercised at the plants of the Chevrolet division of General Motors Corp. recently. The pictures were presented by the Michigan Safety commission through the courtesy of Chevrolet safety officials.

ADVERTISING PAGES REMOVED

Considers Obsolete Equipment

(*Concluded from page* 28)

prise a bible of depreciation policy.

Let me give them to you as the three cardinal principles, summing up management, engineering and accounting points of view. Your rethinking of depreciation and obsolescence may well be based upon these three principles.

First, the purposes of making depreciation charges. Since investment of capital in an asset is in reality a prepaid depreciation expense, the principal purposes of establishing depreciation reserves through current charges to income are:

a. To maintain capital investment intact.

b. To recover the cost of the asset from the selling price of the products of the asset during the useful life of the asset.

Lists Basic Policies

Second, the methods to be used in accumulating depreciation reserves. Nationally standard rates or methods are not practicable. The prediction of the probable life and productiveness of an asset is essentially a management problem, requiring in each individual case:

a. Determination at the time of purchase of the asset of

Wear because of use.
Obsolescence of asset.
Obsolesence of product.
Rate and method to be used in recovering the cost of the asset.

b. Redetermination of the useful economic life of the asset at regular intervals so as to reconcile predicted life to actual life in practice.

Third, the use of depreciation funds. Depreciation funds accumulated from the selling price of the products of an asset should be subjected to the same budgetary control and accounting record as other elements of production cost.

Every question which has been put to the committee thus far comes back to these three basic policies. It is important to remember that. There are in addition some very simple and significant statements which I shall make in elaboration of these three basic policies. They also are basic in any sound rethinking of depreciation and obsolescence.

Depreciation is a production cost paid in advance. It is as real a cost as such current cash items as labor, material, rent, and power. It differs from these other items only in that it is a fully *prepaid* operating expense, the entire payment being made in advance at the time the asset is purchased.

In modern industry obsolescence is a more important factor than wear and tear. Whenever a piece of machinery or other asset is less profitable than a new and improved one would be, it is obsolete regardless of its age or the amount of wear it has experienced. There is always greater economy in scrapping obsolete equipment than in wearing it out.

Depreciation reserves must be accumulated at the same rate as depreciation occurs. Obsolescence depreciates an asset even though the asset may in some cases be subject to little or no wear and tear from use.

Adequate Records Needed

Adequate records are necessary to determine an accurate depreciation rate for each asset. Not only are such records necessary to satisfy the bureau of internal revenue that the depreciation rates are not excessive for tax purposes, but they are necessary to management in determining accurate and sound policies. A record should be kept of each asset, which for this purpose may be an individual capital unit, a group of similar units, or even in some cases a whole plant.

Funds must be available when required for replacement. Depreciation which is charged to costs and recovered in sales should in theory be set aside in a separate cash account or invested in liquid securities. In practice it may be desirable to employ depreciation funds in the business itself by repaying bank loans or increasing working capital. But when such use is made of depreciation funds it should be borne in mind that they have in effect been borrowed from fixed capital and must be restored when needed, or the result would be the same as if a man borrowed on his life insurance policy to pay current living expenses.

Depreciation reserves should be budgeted just as carefully as other elements of production costs. Management should know at all times whether charges made for depreciation are (1) set aside in an investment fund or securities; (2) used to acquire additional equipment; (3) borrowed temporarily from fixed capital to increase working capital or to avoid bank loans; or (4) lost in some other account and actually eating up the capital of the enterprise.

Depreciation rates must be adapted to individual plants and individual assets. While nationally standard depreciation rates or methods are not practicable, it is probable that common standards may be applied to like corporations or like assets where operating and competitive conditions are similar. Differences must be recognized such as those which exist between depreciation in the mass production industries with rapid obsolescence and in the capital goods industries with a more diversified group of assets. It must be recognized that individual plants present individual problems.

Rethinking depreciation and obsolescence has a very practical result. Psychologists tell us that the desire to make money is a basic urge of mankind and that is exactly where rethinking on depreciation comes in. There is money to be made and saved in rethinking depreciation and obsolescence.

Some of the profits of this frequent restudy appear in unexpected forms. When we were boys many of us read or were told the story of a man who longed for great wealth. His mind was constantly on gold and methods for acquiring it. One night in a dream he saw rich stores of the yellow metal buried under an apple tree in the neglected orchard outside his back door. When he awoke he took a spade and began digging at the spot where he had seen the buried treasure in his dreams. He dug and dug, but found no gold. After several days all the soil in the entire orchard had been turned over, but he found no buried treasure. That year the trees which had been barren for many years produced a valuable crop because of the long needed tilling of the soil around their roots.

Systematic Study Valuable

Executives are led to dig into the subject of depreciation reserves by the desire to save as much as possible on taxes, but in that study they uncover facts which lead to prevention of capital impairment and the reinvestmnet in use of assets which they would never have discovered otherwise.

Keeping the tax bill down is not the primary purpose of studying the depreciation problem. That is definitely secondary because it is small in comparison with what can be accomplished in more profitable operations as the result of the studied application of sound policies. It must also be remembered that the government cannot follow sound taxing policies unless and until industry itself applies the sound policy and procedure upon which it expects sound taxing policies to be based. The first move is up to industry.

Once you get into a systematic study of depreciation reserves and obtain the co-operation of your engineering and accounting heads in finding the facts and adopting sound policies, the results will be so tangible that you will keep your management policies as up-to-date and free from obsolescence as the physical equipment of your plants.

Congress Meets In Paris

(*Continued from page* 33)

On Friday afternoon a special visit was organized to the Palace of Discovery, at the Paris exhibition, where almost every aspect of the origins and developments of science to this day were demonstrated clearly and cleverly. The visit was conducted personally by M. G. Urbain, of the Chemical section of the French Academy of Science, and by M. J. Perrin, undersecretary of state for scientific research. The visitors were able to visualize the relation of pure science to technology, and foundrymen were specially interested in the metallurgical and metallography sections, which contained a wide variety of the most up-to-date equipment.

Group at the reception of the Paris chamber of commerce in the gardens

On Saturday afternoon the International committee on testing cast iron held its meeting with J. Leonard, president in the chair, supported by Professor Portevin. A report by Professor Korber, of Germany, was discussed; a number of specific points were reviewed, and a programme of work for the ensuing year was agreed upon. The International committee on the dictionary of foundry terms held its meeting in the afternoon of Wednesday, June 23rd, J. M. Espana presiding.

Later on the same day was held the meeting of the International Committee of Foundry Technical Associations, with Vincent Delport, European Delegate of the American Foundrymen's association, president, in the chair; supported by T. Makemson, honorary secretary. The following countries were represented by their official delegates: Belgium, Czecho-Slovakia, France, Germany, Great Britain, Holland, Hungary, Italy, Poland, the United States.

The meeting dealt with various points of organization concerning international foundry congresses and exchange papers, and received the report of the committee on the dictionary of foundry terms, together with a draft copy of a tentative first edition, prepared by the French committee under J. M. Espana.

It was confirmed that the next congress would be held in Poland in September 1938, and a formal invitation was issued by M. K. Gierdziejewski, president of the Polish Technical Foundry association. An Industrial congress with full American participation is scheduled for 1939 in Great Britain, and Italy will be the venue for 1940.

The meeting then proceeded to elect its officers for the year 1938. Dr. Ing. Bannenberg, president of the German Foundrymen's association, was elected president, and Italy was elected as the country to designate the vice-president. Dr. Guido Vanzetti acknowledged the honor on behalf of the Italian foundrymen whom he represented at the meeting.

Previous to the meeting, the members of the International committee had been entertained at lunch by their President, Vincent Delport, who then conducted them to the Arc de Triomphe where he and M. A. Brizon, President of the French association, laid a wreath on the tomb of the Unknown Soldier, this gesture being made on behalf of all the foreign associations that are members of the committee.

Among the interesting visits that took place during the congress in addition to works visits, were an inspection of the vast laboratories of Ecole Centrale des Arts et Manufactures, one of the leading engineering schools of France, with Professor L. Guillet, director, as guide. Professor A. Portevin conducted a visit through the Ecole Superieure de Fonderie, of which he is the director.

The closing session of the congress took place Thursday afternoon, June 24, under the presidency of M. Julien, under secretary of state for technical education. At this session Professor Fr. Pisek, president of the Czech Foundry Technical association, gave a lecture on "International Importance of Industrial Research", in which he reviewed the high spots of research development in the world since the beginnings of industrialization, and showed that progress is due to the accumulation of results derived from the efforts of research workers from every country.

Medals Are Distributed

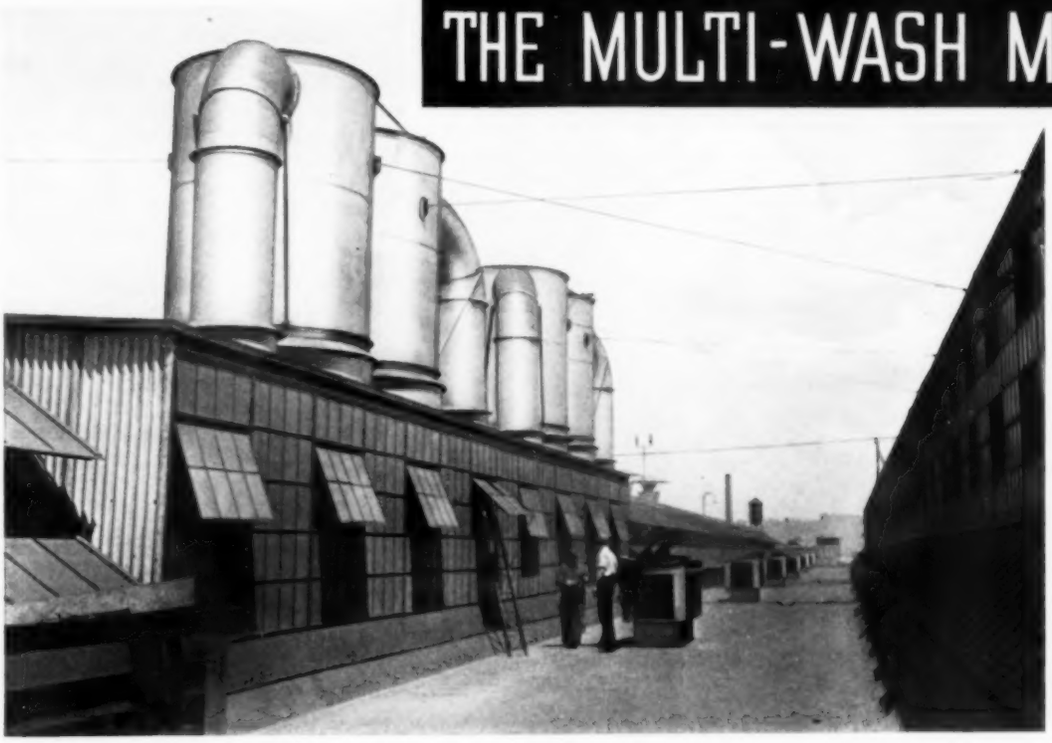
A. Brizon, president of the French association, summarized the work done during the congress, and emphasized the importance of the formation of the new committee on foundry defects. Short addresses were given by Vincent Delport, who expressed thanks on behalf of the foreign associations to the association Technique de Fonderie and the organizers of the congress, and by M. Julien.

A distribution of medals then took place, the gold medal of the association being awarded to Dr. Paul Bastien, in charge of the course of Chemistry, Ecole Centrale des Arts et Manufactures, Paris, and Professor at Ecole Superieure de Fonderie; Ch. Dennery, general secretary of the Syndicate of Bronze and Brass Foundry owners, received the silver medal; and Guy Henon, of the French Centre of Foundry Research received the bronze medal. A special gold medal was awarded to J. Leonard, president of the Belgian Foundry Technical Association for the services he has rendered over a number of years to the foundry industry in general. The only other previous recipient of this medal was the late Emile Ramas.

The closing banquet on Thursday night attracted a large number of guests. Speeches were given by A. Brizon, V. Delport, H. Luc, and Eugene Dady, president of the

(*Continued on page* 80)

THE SUREST METHOD - THE MULTI-WASH METHOD!



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Foundry air, contaminated with dust from molding, conditioning, shake-out, tumbling, grinding and other foundry operations, is drawn into the Multi-Wash Tower by ducts strategically located near these operations and is pulled upward through the turbulent spray of water with a "corkscrew" motion, passing over the impingement plates which scrub the air thirteen times, precipitating the dust to the sludge cone from where it is pumped to the Multi-Louver Dewatering Tank. Here, freed of its burden of dust through a simple precipitation process, the water is recirculated by another Schneible "Wear-Proof" Pump.

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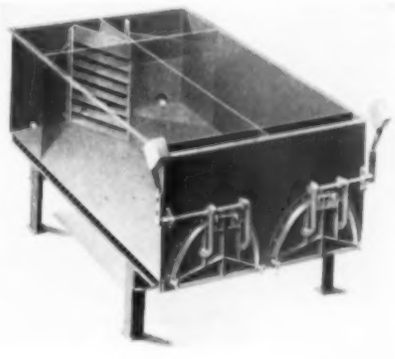
Catalog No. 10 tells what is being achieved in other foundries with the Schneible Wet Method, and gives complete engineering data. Write for your copy today.

A recent installation of four 20,000 c.f.m. Multi-Wash Collectors at a large Midwestern foundry, installed on the roof to economize in floor and lantern space.

Below is pictured the Schneible Multi-Louver Rectangular Dewatering Tank—a sure, simple, foolproof unit for dewatering sludge and salvaging circulating water for re-use. Dewatering Tanks are made in types and sizes to suit all operating conditions.



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(*Continued from page* 78)

Friendly and Mutual Foundry society. All emphasized the necessity for close co-operation both nationally and internationally. Various social events were arranged during the congress.

At the conclusion of the Congress, it was agreed on all sides that President A. Brizon — who attended the Philadelphia congress in 1934 — and his colleagues, deserved full credit for all the arrangements made so successfully.

The 46 papers presented at the congress covered almost every aspect of foundry practice and organization and ranged through gray iron, malleable, steel, bronze and brass, and light alloy castings. The papers were divided into two groups, the one comprising 12 exchange and official papers, and the other comprising the remaining so-called individual contributions. For the convenience of the following brief review the papers are divided into groups in accordance with the subject matter, as follows: Gray iron, special iron, malleable iron, steel, nonferrous, light alloys, molding sand, testing, foundry defects, miscellaneous subjects.

Discusses Grain Size

The gray iron section included the exchange paper of the Belgian Technical Foundry association on "Grain Size in the Foundry". The author, Michel Gevers, of Societe Angleur Athus, referred to the investigations made on steel by Murphy and Wood in America, and described his own experiments in regard to cast iron. He has arrived at interesting conclusions, although in some respects these are different from those arrived at in respect to steel.

In the discussion, Professor Portevin explained that in steel there are three kinds of grain size superposed over one another: the one appears in the macrostructure after forging, then comes the austenitic grain size, and then a tertiary structure after the eutectoid point has been passed. If the heat treatment is modified, the grain size is modified, and for a cast steel the size of the grain depends upon the influence of the last reheating effected. In regard to cast iron, the copper re-agent brings out the last portion to be solidified, and the significance of the grain in cast iron is not the same as in steel. T. H. Turner, L. N. E. R. Railway Co. Doncaster, England, made a distinction between grain size, as considered by the author of the paper, and what the American and the British call the *inherent grain size.*

The exchange paper contributed by the Czech Technical foundry association was by Dr. E. Valenta and N. Chvorinov, and was entitled "Some Interesting Remarks On the Addition of Silicon and Tin to Gray Iron." The addition of a rich ferrosilicon to liquid iron modifies its graphitization and increases the tensile strength, the transverse test figure and the fatigue limit. Small additions of tin, from ¼ to ½ per cent, seem to increase the resistance of the matrix and correspondingly the physical characteristics. With a higher percentage of tin, the strength of the iron tends to decrease, but the resistance to wear appears to improve. Replying to a question by M. Olivo, Italy, the author stated that the additions were made in the ladle.

Study Malleablization

Professor Dr. A. Lissner and Dr. O. Kahl of the German Polytechnic school, Brno, Czecho-Slovakia, contributed a paper entitled "Recent Studies On the Graphitization of a Pure White Iron". The author carried investigations on a chemically pure white iron, containing 59.92 per cent Fe_3C, and which had first been melted *"in vacuo."* Results of experiments were presented and a diagram giving the effects of CO and CO_2 on the decomposition of the carbide was shown. The authors have arrived at certain tentative conclusions concerning malleablization of iron.

In the "Special Iron" section came the American exchange paper by W. P. Eddy Jr. chief metallurgist, Yellow Truck & Coach Mfg. Co., Pontiac, Mich. The title was "Irons for Industrial Motor Vehicles." The author described various types of cast irons used for certain parts of industrial motor vehicles, which are cast on a production basis. He referred particularly to cylinder blocks, valve seats, manifolds, brake drums, and gave characteristics of irons used with greatest success. In the discussion that followed it was mentioned that, in France, pearlitic iron had been found satisfactory for brake drums, and that if the iron contained more than a certain percentage of cementite, the braking qualities were not so good.

Jean Challansonnet, Consevatoire National des Arts and Metiers, Paris, contributed a paper "Study of the Martensitic Hardening of Molybdenum-Vanadium and Nickel-Molybdenum-Vanadium Irons", in which he gave results of his investigations on iron containing additions of molybdenum and vanadium; or molybdenum, vanadium and nickel, associated together. Such additions in given percentages, improve the mechanical characteristics of the iron after proper heat treatment.

The same author contributed another paper entitled "Influence of Vanadium on the Nitriding of Irons" in which he compared the influence of vanadium with that of chromium in a nitrided iron containing aluminum and molybdenum. He has found that the action of each of the two elements presents little difference. In another paper "Properties of Certain Special Irons at High Temperatures", M. Challansonnet gave results of investigations on irons containing chromium, vanadium, nickel or an association of these elements, melting having been effected in the electric furnace.

A contribution to this section by Great Britain was by Dr. A. B. Everest, Mond Nickel Co. Ltd., London, president of the London Branch of the Institute of British Foundrymen. His paper was entitled "Ni-Resist Cast Iron in Great Britain", and he gave a number of illustrations of the applications of that iron, and reviewed its main characteristics and possibilities; particularly as regards resistance to corrosion, erosion, heat and electrical resistance.

Describes Refined Irons

From Great Britain also came a paper from G. T. Lunt, managing director Bradley & Foster Ltd., Darlaston, on "Industrial Production of Refined Irons for High Quality Castings." The author described certain refining methods used in England for the production of irons more specially suitable to certain uses. These are divided into four main classes: Refined malleable pig-iron, refined cylinder pig-iron, special refined pig-iron qualities, refined alloy pig-iron.

Two more papers in the section were "Influence of Chromium in Special Low Carbon Irons", by C. O. Burgess, and "Contribution to the Study of Super-Hardening Nickel-Manganese Irons", by G. Delbart and E. Lecoeuvre.

The exchange paper of the Institute of British Foundrymen, by H. H. Shepherd, chief metallurgist, Crane, Ltd., Ipswich, was entitled "Malleable Iron Melting Practice—Retrospective and Prospective," and considered melting practice as employed for the manufacture of black-heart and white-heart castings. Stress was laid on the necessity for scientific control of raw materials, sand in particular. Progress in the use of steel scrap was dealt with, also the effect of various elements. Finally the various methods of melting and types of furnaces were reviewed.

A paper contributed by Jan Obrebski, was entitled "Heat Treatment of Heavy Nickel-Chromium

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ADVERTISING PAGES REMOVED

(*Continued from page* 80)

Steel Castings." The author pesented a novel method of heat treatment for heavy steel castings, which combines isothermic softening with a subsequent re-heating at 10 to 20 degrees Cent. below the Ac_1 point followed by as rapid cooling as possible. The experiments were made in the laboratory and use was made of dilatometric diagrams.

Two papers dealt with copper alloys. One was the German exchange paper "Segregation Phenomena in Lead Bearing Bronzes", by Dr. W. Claus, Berlin. Two types of segregation are possible in such bronzes: Simple phenomena resulting from the alloying conditions of the copper, and the lead, and inverse segregation *en bloc*, due to the fact that during solidification, liquid portion remains within those parts that solidify last, and this liquid portion passes into the first solidified parts, owing to the formation of gasses. The author indicates technical methods enabling good results being obtained with these bronzes.

Nonferrous Castings

Dr. J. Laissus, consulting engineer, Chambre Syndicale des Fondeurs en Cuivre et Bronze de France, Paris and L. Persoz, civil mining engineer spoke on "Cupro-Gluciniums; Their Interest and Prospects, Particularly in Copper Alloy Castings". The most current types of such castings contain from 2 to 3 per cent glucinium. They acquire interesting characteristics by an *ageing treatment*.

Light alloy castings were considered in a number of contributions. Dr. R. Irmann, S. A. pour l'Industrie de L'Aluminium, Neuhausen, Switzerland, gave a paper on "Influence of the Conditions of Solidification on Aluminum Castings". The author stated unfavorable effects of a large grain structure can be exaggerated, but that such a structure is better avoided. This can be done by the addition of titanium or cerium. Acute angles also are to be avoided.

"Feeding Molds in Aluminum Alloy Castings" was the title of a paper by R. Perret, in which the author indicated certain defects are due mainly to defective pouring. Gates and runners should be kept filled with liquid metal, rate of pouring should be under control and not exceed a given speed, to avoid formation of oxyde films.

E. Pizzoglio, Italy, discussed aluminum and other alloy castings in a paper entitled "Casting in Aluminum and Other Metals". J. Castel, Engineer, Cie Alais, Froges & Camargue, France, contributed a paper "Remarks on the Light A. P. 33 Alloy". This is an aluminum-copper alloy containing between 4 and 8 per cent copper, and a small percentage of titanium. It answers favorably to heat treatment, with a resulting tensile strength of 32 to 37 kilograms per square millimetre (45,515 to 56,626 pounds per square inch) and an elongation of from 6 to 10 per cent.

"Control of Temperatures and Aluminum and Bronze Foundries", was the title of a paper by R. Laprand, technical director, Societe "La Pyrometrie Industrielle", Paris, in which the author described various types of thermoelectric couples for measurement of temperatures.

Molding sand was the subject of three papers, of which one was the exchange paper of the Polish Technical Foundry association, the author being Waclaw Gurycki, Warsaw, and the title "Contribution to Standardization of Binders and Methods of Determining Their Amount in Molding Sands". The author recommends particles smaller than 0.01 millimeters be classified as binding particles. He shows that binding particles can be extracted in relatively short time by agitation in a solution containing 0.025 per cent of soda.

Use Vertical Molds

A contribution, "New Method of Molding and of Preparing Sand", by Mario Olivo, foundry engineer, Milan, Italy, was accompanied by an interesting film. The author described a molding machine specially devised for vertical castings such as radiators. Flasks are kept vertical, and sand is rammed sideways by a hydraulic piston. When the flasks have been filled with sand, rammed, and cores have been placed, the molds are carried to the pouring station by a special conveyor that keeps the molds in the vertical position.

Professor Dr. Fr. Pisek, president of the Czech Technical Foundry association, and B. Holman, contributed a paper entitled "Relations Between the Molding Properties of Sands". Following tests on 48 kinds of molding sands at the Technical high school of Brno, of which Dr. Pisek is director, the authors have arrived at a relation between the cohesion of sand grains, and their size and clay content, a relation between permeability, and grain size and clay content, and a relation between permeability, and grain size and cohesion.

The testing of cast iron was, as usual, a subject that attracted much interest, and was treated from different aspects in half a dozen papers. P. Chevenard, scientific director, Societe Commentry-Fourchamboult et Decazeville, Saint-Etienne, France, discussed "Influence of Dimensions, Shapes and Pouring Conditions of Test Pieces on Mechanical Tests for Castings, With Special Reference to Ordinary and Special Steel Castings."

A short paper, "Example of the Application of Apparent Density Test Piece for Castings Working Under Pressure" was contributed by Ch. Dennery, Fonderie L. Hirsch & Cie, Bagnolet, near Paris. The author stressed importance of choosing a test piece made so as to withstand pressure under more unfavorable conditions than the casting. He explains how tests should be conducted.

Relation of Hardness

Dr. G. Meyersberg, Berlin gave a paper entitled "Relations Between Hardness and Other Characteristics of Cast Iron", in which he stressed that no precise relation exists between hardness and other characteristics; however, machinability enables a general idea to be obtained of the qualities of an iron, account being taken of hard spots, etc. In the discussion, L. Girardet pointed out that it is not only the iron that must withstand abrasion, but that the iron itself exercises a wearing effect on a tool when it is machined.

Professor Portevin emphasized that there can be no relation between hardness and other characteristics, because these factors are completely different, and the resulting stresses are different; furthermore to be comparable, all test pieces should be identical for the various tests. He drew attention to the part graphite plays by its lubrication qualities when an iron is machined.

"Application of the Pneumatic Micrometer to the Control of Castings" was the title of a paper by A. Brizon, Fonderie A. Brizon, near Paris, and L. Wattebot, Societe du Carburateur Solex, Paris. The authors described an apparatus based on the measurement of the flow of air through the casting to be tested. It is used mostly for castings working under pressure and made by pressure die-casting under mass production conditions.

Special mention should be made of two papers dealing with the question of defects of castings. The first paper by Prof. A. Portevin, was entitled "Suggestions for a Logical Classification of Foundry Defects"—Introduction — Defects Due To Metal." The second paper by A Debar, Professor at Ecole Superieure de Fonderie, Paris, dealt with "Defects Due to Molding Operations." The two papers taken together give an analysis of foundry defects from the point of view of their fundamental causes, these being inherent either to the condition of the metal itself, or to the

conditions of molding, due to the sand, the ramming operation, etc.

The reading of the two papers caused many delegates from various countries to express the wish that the various views relating to and definitions of foundry defects be correlated, and that foundrymen from various countries should, so to speak, employ the same language when referring to foundry defects. It was therefore proposed to set up an International committee to study this question, and that Professors Portevin and Debar should prepare a preliminary report on the subject as a starting point. This recommendation was acted upon at a special meeting of the International committee of foundry technical associations, and the new committee was officially appointed with Professor Portevin as president.

About 15 papers were given on various aspects of foundry practice or foundry organization which do not enter into the section previously reviewed. The following gives a brief review of the subjects referred to:—

Uses of Castings

Two papers dealt with "New Outlets for Castings." One was by Paul Muguet, Soc. An Commentry Fourchamboult—Decazeville, and was specially concerned with iron castings, the other by R. Lemoine, assistant director Ecole Superieure de Fonderie, dealt with steel castings. The authors brought out the economic and technical advantages of castings and the field within which they could be used.

L. F. C. Girardet, foundry proprietor, Saint-Die, Vosges, France, contributed a study on "Iron Castings. The Shape They should be given to Derive the Most from Their Mechanical Properties," in which he showed that static tests on test pieces are not sufficient to give a precise idea of fatigue in machine components, but that the design and shape of such components must be taken into consideration.

Professor M. Veron, Ecole Centrale des Arts et Manufacture, Paris, gave a paper entitled "Superficial Effects in Cylinder Blocks of Internal Combustion Engines and Improvement of Cast Iron Blocks" in which he described a process of manufacturing cylinder blocks by the combination of specially chosen iron alloys and of a special finishing method used for the interior of the cylinders.

A paper entitled "Suggestions on the Possible Applications of Autogenous Welding in the Foundry" was given by R. Granjon and R. Gerbeaux, Institut de Soundure Autogene, Paris. The paper is specially concerned with the use of autogenous welding to increase the safety in use and the rigidity of foundry equipment, and with the making of castings in separate sections which later are assembled by welding.

Louis Maillard, Societe d'Electrochimie, Paris, gave, in a paper entitled "Application of Hydraulic Cement Compositions in the Foundry," the result of investigations on the permeability and cohesion of the sand-cement composition used for a semipermanent molding method. The investigations were carried out at the French Institute de Recherches de Fonderie by the method used by the American Foundrymen's association.

Studies Corrosion

A paper by Ludvick Olsanski, was a study on "Corrosion of Cast Iron and Steel Tubes," in which the author indicated that cast iron tubes resist corrosion better than steel tubes; in cast iron tubes corrosion will set in quicker if the graphite is in large flakes.

Guy Henon, Centre de Recherches de Fonderie, Paris and Saulnes, described a method of manufacturing coke in which lime is embodied into the coke and gives it the property of removing slag without further addition of lime in the cupola. His paper was entitled "Auto-Scorifying Cupola Coke." Francois Simorre, foundry engineer, described a method of designing and preparing molds for straight arm pulleys in a paper "The Manufacture of Straight Arm Pulleys in Cast Iron."

A paper by Dr. M. Ballay and R. Chavy, Centre d'Information du Nickel, Paris, dealt with "White Irons and Cupro-Nickels for Use in Conjunction with the Blowpipe." One paper by Albert Dormoy, foundry proprietor, Bordeaux, dealt with "Foundry Production Costs." A paper by Felix Henon, was concerned with "Late Deliveries in the Foundry." R. de Fleury, foundry engineer, Paris, gave a paper entitled "Rational Order for the Use of Materials in Relation to Their Applications." M. Blanchot, engineer at the French State Railroad Co., Sotteville, described recent improvements in the company's foundry in a paper, "Improvements in the Organization of the State Railroad Foundry at Sotteville." E. Kracmar, Czecho-Slovakia, contributed a paper entitled "Safety Means Against Accidents in Czech Foundries."

General Refractories Co., Philadelphia, has apponited the Tennessee Mill & Mine Supply Co., Knoxville, Tenn., as distributor of its products in that area. A complete stock of refractories will be carried.

Iron Castings Must Be Perfect

(*Concluded from page* 35)

the hoppers by pulling an overhead lever. Jolting, squeezing and automatic venting are applied to both the cope and the drag.

Uniform weights on molds hold variation in thickness to a minimum. Iron is poured from ladles suspended from uniform height ladle hooks. Four castings are connected to one sprue. The stream of molten iron is continually uniform. Thickness variations in the castings due to straining of mold are exceptional. Temperature of the iron required to pour these sharp 55 degree edge design castings must exceed 2700 degrees Fahr.

To insure uniformity in drilling, tapping and machining operations, readily machinable iron is required. Travel time of conveyor is regulated so that no casting hardness exists as a result of being shaken from the mold too soon.

Castings Are Inspected

Castings are inspected under a strong light, and any that show even the slightest pin holes on the bottom or sides are rejected. Individual piece castings inspection includes the use of *go* and *no go* gages for overall thickness and size of element recess, close observation of soundness, flatness, and smoothness. Castings having any points, or pimples on the top side are set out for the work necessary to remove same. Rejected castings are separated according to the number stamped on each pattern, and a daily record is kept of these rejections. Castings passed by the inspector go to the grinders to be finished and then made ready for shipment.

Grinding the slight amount of gate stub, the final operation performed at the Cleveland works, is done with one crossing of the wheel, on a specially designed angular grinding rest which eliminates the possibility of an underground, or rejected casting.

Fractures of broken castings are examined daily for control of metal structure. Assembly of the element and base casting, under pressure of 20 tons, calls for a casting of close grain, strong, readily machinable iron, with the bead on the top side of the casting showing gray in fracture. Chemical analysis and periodic physical tests of metal, daily check of moisture, green strength and permeability of cope facing, drag facing, and conveyor system sands provide definite control for production.

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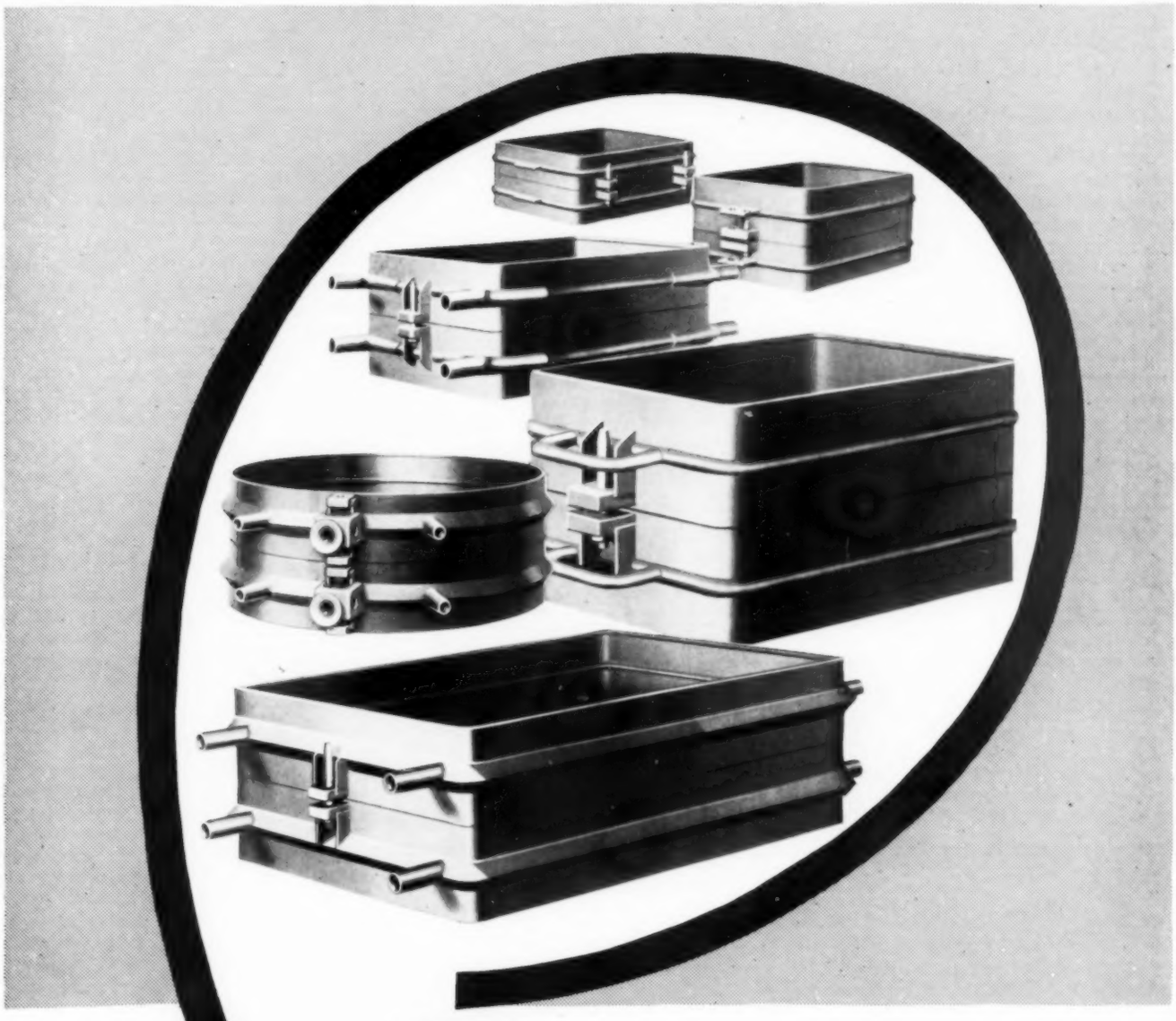

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MILWAUKEE, WISCONSIN

Major R. A. Bull Is Dead

MAJOR R. A. BULL, 63, prominent steel consultant for many years with headquarters in Chicago, died in Anniston, Ala., July 29, while on a business trip. He was a past president and honorary member of the American Foundrymen's association, past research director of the Electric Steel Founders Research group and a leading personality in the foundry industry for many years.

Major Bull was born in New Albany, Ind., June 28, 1874 and was educated at Depauw university, Greencastle, Ind., and at Butler university, Indianapolis where he received a bachelor of arts degree. Later he received the degree of master of arts from St. Louis university. Entering the metal industry he spent 5 years as inspector in the service of Robert Hunt & Co., and the succeeding 23 years in the following positions set down in chronological order: Chief inspector and foreman of pipe run, United States Cast Iron Pipe & Foundry Co., Bessemer, Ala.; chief inspector Shickle, Harrison & Howard Iron Co., East St. Louis; general foreman and later assistant to vice president and general manager Leighton & Howard Steel Co., St. Louis; district inspector for the East St. Louis and Granite City plants of the American Steel Foundries; chief clerk to second vice president and later chief clerk to general sales agent American Steel Foundries, St. Louis; manager order department same company, New York; assistant works manager, general superintendent and manager of production Commonwealth Steel Co., Granite City, Ill.; vice president and general manager Chicago Steel Co., Chicago; vice president and general manager Duquesne Steel Foundry Co., Coraopolis, Pa.

During the war he served as major in the ordnance department, division of construction and maintenance and saw service in France. In 1921 he organized and served as director of research Electric Steel Founders Research group where he was instrumental in conducting successful research investigation of vital importance to the industry and where he generously contributed information to the foundry field through papers presented before meetings of the A.F.A., and in the technical press. In recognition of his services in many fields of foundry endeavor he was awarded the Joseph S. Seaman gold medal at the 1927 A.F.A. meeting in Chicago.

He joined the American Foundrymen's association in 1907 and was elected district vice president in 1911, first vice president in 1914, president 1915 and 1916 and a director of the association from 1915 to 1925. During his term as president the association passed through a reorganization period, became an incorporated body and took over the management of exhibitions.

In addition to contributing papers of a technical character Major Bull served as member and as chairman

Major R. A. Bull

of many important committees. Largely through his efforts as first chairman of the joint committee on molding sand research, the work was successfully launched resulting in development of methods for sand testing and for making geological surveys of foundry sand resources. In 1923 he presented the American Foundrymen's association exchange paper before the Institute of British Foundrymen.

In addition to the A.F.A., Major Bull was a member of the following technical societies: American Institute of Mining and Metallurgical Engineers, American Society for Testing Materials, American Society for Metals, American Electrochemical society, American Iron & Steel Institute, American Welding society, American Association for the Advancement of Science, Society of American Military Engineers, Army Ordnance association, British Iron & Steel institute and the Institute of British Foundrymen.

Herr-Harris Co., 910 Fulton building, Pittsburgh, has been appointed sales representative of the George P. Reintjes Co., Kansas City, Mo., for the sale of walls and arches in the Pittsburgh territory.

Obituary

HARRY E. MONNEY, formerly foundry superintendent Falk, Corp., Milwaukee, died July 6. Mr. Monney first worked for the Falk Corp. in 1900 when he was sent there by the Wellman, Seaver, Morgan Co. to superintend the construction of the first open-hearth furnace operated in the Falk foundry. Upon completion of that job, he remained with the Falk company as head melter and held that position until 1913. During that time, two additional open-hearth furnaces were installed and put in operation in the foundry. In 1913 he was made foundry superintendent in charge of all foundry operations and held that position until 1932 when he left on an extended leave of absence for a much needed rest. However, his health failed and he did not return to work.

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William S. Walker, 66, for six years president of the American Silica Sand Co., Chicago, died, July 15.

• • •

Max A. Bollman, 57, chief inspector for the Stewart Die Casting Co. for 25 years, died at his home in Chicago on July 21.

• • •

John Devine, 53, founder and president of the Devine Pattern Works, West Allis, Wis., suburb of Milwaukee, died July 1 after a brief illness.

• • •

John Leonard, 82, one of the oldest molders in Cleveland died July 24 at his home. Mr. Leonard became assistant to his father at the age of 12 and was a molder of 60 years before he retired in 1927.

• • •

Edmund Rankin, 82, retired foundry owner of Lincoln, Ill., died recently. Mr. Rankin operated a foundry for many years and was known to have perfected a number of practical inventions in that field.

• • •

Fitz William Sargent, 78, chief engineer, American Brake Shoe & Foundry Co., New York, since 1902. died July 25 at his home in Mahwah, N. J. He had contributed much in the development of brake shoes for steam and electric trains. Mr. Sargent was graduated from Lehigh university in 1879 with a degree in civil engineering. He spent much of his earlier career with railroads and in 1891 joined the Congdon Brake Shoe Co., Chicago. Two years later he be-

(*Concluded on page* 89)

ADVERTISING PAGES REMOVED

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came chief engineer of the Sargent Co., leaving this organization in 1902 to take similar position with the American Brake Shoe & Foundry Co. He was a member of the American Society of Mechanical Engineers.

♦ ♦ ♦

Frank G. Cornell, president, Chemung Foundry Corp., Elmira, N. Y., a director and for many years general superintendent of the Shepard Niles Crane & Hoist Corp. of Montour Falls, N. Y., died June 24 at his home in that city. Mr. Cornell was active in the affairs of his community and was a former mayor of the village of Montour Falls.

♦ ♦ ♦

Joseph M. Dickson, 61, branch manager of the Sterling Wheelbarrow Co., Milwaukee, in the Cleveland territory, died in Lakewood, O., Saturday, July 17. Mr. Dickson was born in New York City, but lived the greater part of his youth and was educated in Milwaukee. He was connected with the Sterling Wheelbarrow Co. for 25 years, the first 7 as salesman in Milwaukee and the last 18 years as branch manager at Cleveland.

♦ ♦ ♦

Frank D. Chase, architect and specialist in industrial plant design and construction, died unexpectedly in his home at Evanston, Ill., July 23. A graduate of Massachusetts Institute of Technology, since 1913 he had been president of Frank D. Chase Inc., Chicago. For several years Mr. Chase was architect for the Western Electric Co., Chicago, later serving in the same capacity for the Illinois Central railroad. He was a former president of the Western Society of Engineers and a member of the American Society of Civil Engineers.

Book Review

Tool Room Grinding, by Fred B. Jacobs, fabrikoid, 221 pages, published by the Penton Publishing Co., Cleveland, and supplied by THE Co. Ltd., London.

Grinding operations on tools FOUNDRY, Cleveland, for $3.50, and in Europe by the Penton Publishing whether made in quantity for merchandising or a few at a time for shop use, must be performed with great care to insure accuracy, and for that reason the author has gone into great detail in this book in describing various operations. The volume is divided into seven chapters of which the first is devoted to tool room grinding equipment. Chapter II discusses grinding of jig components while grinding operations on arbors, counterbores, and reamers are described in Chapter III.

Milling cutter grinding operations is the subject of the fourth chapter, and Chapter V is concerned with grinding of precision gages. Chapter VI describes grinding operations in diemaking, and the final chapter discusses the salvaging of small tools such as milling cutter, spiral mills, shell reamers, twist drills, etc. That chapter in itself is almost worth the price of the whole book, as considerable money can be saved by following its directions. A good index facilitates location of articles.

Chapter Hears Talk On Open Hearths

George Stetter, Los Angeles division, Bethlehem Steel Corp., addressed the newly formed Southern California Chapter of the American Foundrymen's association at its first annual meeting held at the Clark hotel, Los Angeles, on June 24. Mr. Stetter stated that the operation of an open hearth furnace today is largely mechanical, and better steel is being made than ever before. Foundries can do the same thing if they record and duplicate good heats and prevent the recurrence of bad ones. He pointed out that control has been taken out of the hands of operators and placed in charge of the metallurgical division.

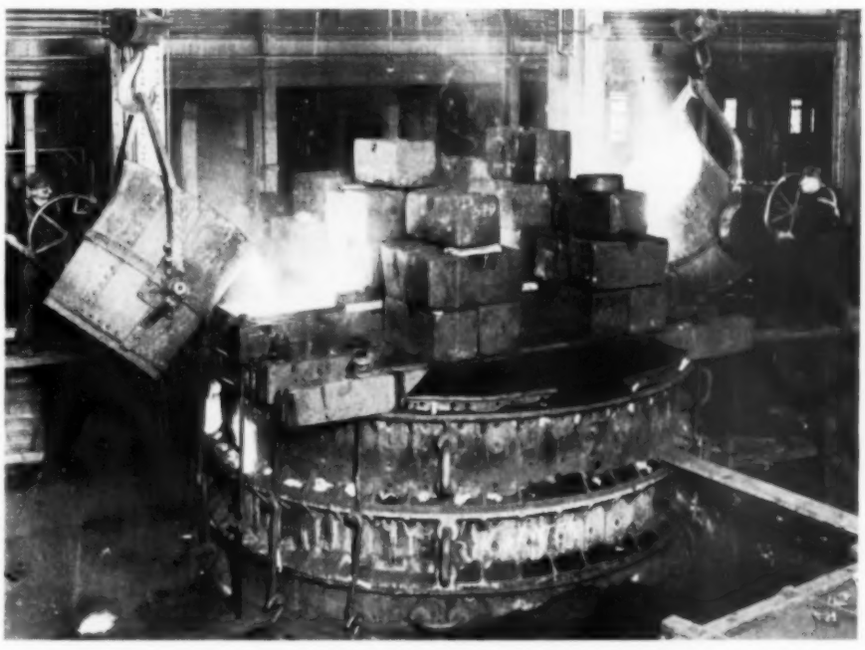
The following officers were elected: Chairman, Robert Gregg, Reliance Regulator Corp.; vice chairman, J. G. Coffman, Los Angeles Steel Casting Co.; and secretary-treasurer, L. O. Hofstetter, Washington-Eljer Co. The following were elected to the board of directors: Earl Anderson, Enterprise Foundry Co.; James E. Eppley, Kinney Iron Works; E. Green, Axelson Mfg. Co.; C. E. Hopping, Alhambra Foundry Co.; G. W. Merrefield, Kay-Brunner Steel Products Co.; W. C. Patterson, General Electric Co.; J. H. Wilkins, Vernon Foundry Co.; and Albert G. Zima, International Nickel Co.

While definite figures were not available, it was estimated that the new chapter has 75 members and expects to increase this to 100 during the coming year. The membership decided to hold meetings through the summer, to facilitate organization work and to prepare for the fall programs.

Group Officers

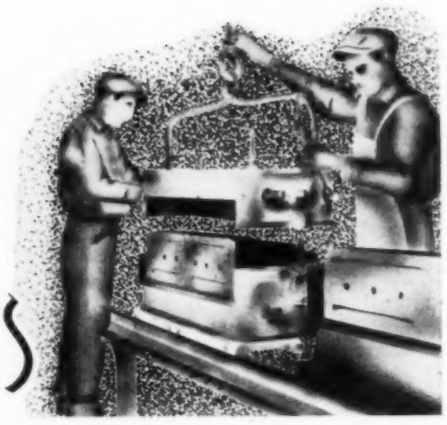
The Twin City Foundrymen's association has the following officers: President, O. W. Potter, University of Minnesota, Minneapolis; vice president, H. H. Bloasjo, Minneapolis Electric Steel Casting Co., Minneapolis; treasurer, H. J. Kaime, Union Brass & Metal Mfg. Co., St. Paul.

Pouring High Test Iron Casting



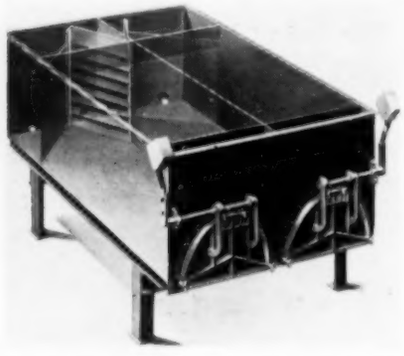
THE pouring of hot metal is always an interesting sight. This picture was taken recently at the Allis-Chalmers Mfg. Co.'s plant in Milwaukee which has one of the large gray iron foundries of the Middlewest, where castings weighing 100 tons and over can be made when necessary. The medium heavy casting being poured is an end head of a 10½-foot diameter by 12-foot long dry-grinding preliminator for a big cement company. The molten high-test nickel-iron for this 14-ton casting is shown being poured into the mold simultaneously from a 10-ton and a 7-ton ladle.

NEW EQUIPMENT for FOUNDRIES



Dewatering Tank

The new rectangular tank multilouver dewaterer has been introduced by Claude B. Schneible Co., 3951 Lawrence avenue, Chicago.



The unit is made for smaller systems of the wet type dust collectors

The unit is made for use in smaller systems of multiwash dust collectors where the quantity of water and sludge produced does not justify the use of the larger capacity truck type dewatering tank, or the still larger concrete rectangular tanks.

As its name implies, this unit is rectangular in shape and made for setting directly on the floor or on steel legs as conditions require. The tank is made with a divider down the center separating it into twin tanks for alternate use. At one end is the sludge and water inlet distributor trough and located at the opposite end are the weir, skimmer walls, multilouvers, and the recirculating and dewatering outlets.

Sludge and water from the collector is piped to the dewatering tank and enter at the closed end through the inlet distributor trough which directs the combination into one of the sections of the tank. It is claimed that as the sludge and water flow into the tank, precipitation of solids immediately takes place, the skimmer wall holding back floating material as the clear water flows over the weir from where it is pumped back for re-use for dust collection.

The low velocity of water in the tank allows for complete precipitation of the solids in the area around the multilouver vanes. When one of the tanks is sufficiently filled with precipitated material, the inflow water is switched to the other section of the tank by the inlet distributor trough allowing for an additional precipitation period.

After complete settling, the valve on the line leading to the interior of the loaded tank is opened and the head of water in the tank is allowed to recede slowly. The water flows out of the precipitated material and does not carry the material with it due to the angle of repose of the silica sludge against the multilouver vanes.

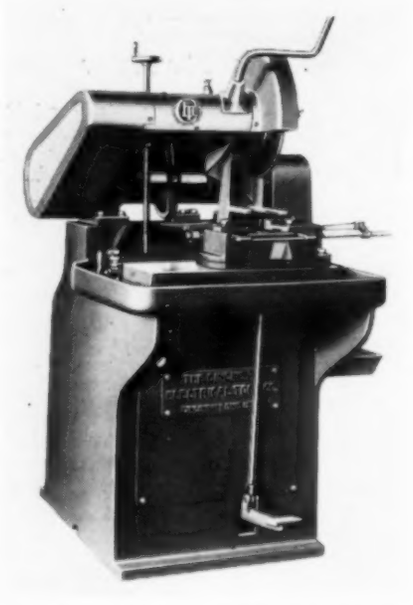
The final draining period reduces the moisture contained in the sludge to approximately 20 per cent or lower. Then the sludge in the dewatered tank is drained completely, the discharge gates are opened and sludge is pushed out into a convenient receptacle for disposal.

Cut-Off Machine

Cincinnati Electrical Tool Co., Oakley, Cincinnati, has developed a wet abrasive cut-off machine suitable for straight or angle cutting. The wet cutting feature is said to increase the life of the abrasive cut-off wheels, produce a cut with a minimum of burr and eliminate burning, as the coolant is directed not only on the point of contact of the cut, but on the sides of the wheel as well. The machine is suitable for making straight or angle cuts in solid materials up to 2¼ inches or tubing up to 3½ inches diameter, the same vise being suitable for the various cuts. In cutting angles up to 45 degrees, however, the maximum capacity is 2¼ inches. Graduations on the table make angle cutting fast and accurate.

The material is held in the vise by spring tension on the jaws and the work is released after the cut is completed by the foot lever, leaving the operator's hands free at all times. The work is held securely on both sides of the cut, eliminating the possibility of cramping and preventing wheel breakage. The abrasive wheel is moved into the work by a hand lever and the arm which carries the abrasive wheel pivots on the pedestal with a counter-balance for easy operation. The abrasive cut-off wheel is guarded completely with exception of that portion which is necessary for the actual cutting.

A stop is provided which can be set for any depth of cut within the machine's capacity, and a longitudinal stop is provided for regulating the length of the material to be cut. Two sets of wheel flanges, in different sizes, are supplied to insure the maximum use of the abrasive wheels. A shaft locking device facilitates changing of wheels.



The abrasive cut-off machine is arranged for wet grinding

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Ladle Controller

Ladle tipping mechanism designed for ladles up to 2000-pounds capacity and designed by the Whiting Corp., Harvey, Ill., is an offshoot of the helical-worm type of gearing first introduced by Whiting in 1920 and later improved to include automatic oil pump and safety brake. In the new model the worm and bevel gears have machine cut teeth and are mounted on ball bearings in a jig machined case insuring alignment and easy operation. With the gearing mounted independent of the bail, chances for binding due to distortion are eliminated. It is claimed the self locking worm holds the ladle in any position, full or empty. Tipping of the ladle can be controlled accurately in either direction.

The unit may be attached to ladles of 1000 to 2000 pounds capacity

Novel arrangement of the gearing insures that every part is lubricated properly. A dust tight gear case with a oil seal on the hand wheel shaft and oil proof fiber gaskets between covers and case provide complete protection from dirt and grit. The unit readily may be attached to old ladles of 1000 to 2000 pounds capacity. Attachment requires only a new hole in the bail for bail lug or anchor, keying the worm wheel to the old ladle and replacing the main cover to the case.

Deoxidizing Agent

Ferrocarbo, produced by the Carborundum Co., Niagara Falls, N. Y., is used in the manufacture of gray iron castings as a deoxidizing agent. The material is essentially silicon carbide and can be added in briquet form to the cupola charge or in the powdered form to the ladle. The amounts used range from ¼ to 1 per cent of the metal treated.

It is claimed that elimination of ferrous oxide from solution in the metal by the material permits greater refinement and more uniform distribution of graphite without breaking down the pearlite. This, it is pointed out, produces strength and improves machinability. The use of a harder base charge is essential to secure the maximum benefits from the use of the deoxidizer. A charge that economically would be impractical to machine is claimed to be made readily machinable with an increase in physical strength. Where economic conditions justify, this tends to high percentages of scrap in the mixture. The deoxidizer in combination with iron or steel is an unstable compound and immediately breaks down into its component parts, silicon and carbon. In this nascent condition they are active deoxidizers. As a result of the deoxidation of the metal, the temperature is increased from 50 to 100 degrees Fahr. and a decided fluidity is observed over an untreated metal at the same temperature. The deoxidizer also is used where greater density is desired in heavier sections, without impairing the machinability of the thinner parts.

Humidifier

A humidifier to be attached either in front of a unit heater or directly behind the unit has been developed by the Unit Heater & Cooler Co., Wausau, Wis. The humidifier may be operated with the unit heater or as an individual unit and even though the fan on the unit heater is shut down, the humidifying action of the device continues to function until the desired conditions are reached in the room, when the controls on the unit will shut down. The operation of the humidifier is at temperatures higher than the room atmosphere, which causes quick absorption of the humidifying fluid or gas.

Lamp Reflector

Benjamin Electric Mfg. Co., Des Plaines, Ill., has designed a reflector for the uniform lighting of bins, stacks and shelves in stock rooms, tool cribs and libraries. The deep, trough-shaped reflector directs light downward to the bins near the floor while the V-shaped reflector bar suspended below the reflector directs light upward, above the cutoff of the reflector.

The units are designed for installation in aisles of from three to four feet. The reflectors are porcelain enameled steel, white inside and out. Four types of hoods are available; Pendent; angle; feed-through; and outlet box. Three sizes of reflectors are obtainable for the 60, 75-100 and 150 watt lamps.

Elevator Buckets

Link-Belt Co., 2410 West Eighteenth street, Chicago, has made improvements in the design and construction of its steel elevator buckets. The new bucket is reinforced at the digging lip, front corners and along the back. Additional strength and greater resistance to abrasive wear and distortion are claimed for this construction without making an increase in bucket weight.

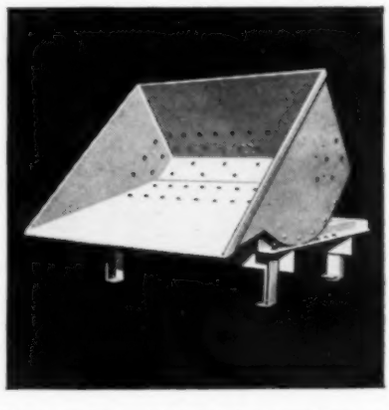
The reinforcing lip is an integral part of the metal body, folded over and spot-welded along the front edge. It is not a separate band. The back reinforcing plate also is spot-welded to the metal body to make a solid structure.

The buckets are made in 2½ x 2½ inch to 30 x 8 inch sizes and are interchangeable with the old types made by that company. The new bucket also can be supplied in copper, brass, aluminum, Monel metal and stainless steel.

Dump Hopper

A new dump hopper, for use with hand or power lift trucks in handling raw materials, parts, waste or finished products, has been designed by the Roura Iron Works, 1401 Woodland avenue, Detroit. The hopper, shown in the accompanying illustration, is designed especially for loads that are hot and for service in departments where the equipment is subjected to elevated temperatures.

The unit is arranged for side dump and also supplied for end dumping. Special alloy steel is used in the fabrication, and both the sides and bottom are perforated to enable the hopper to resist warping. The unit is supplied on legs or casters, with any specified clearance and has one yard capacity. A simple latch holds the load securely in position and when unlatched, enables the hopper to be emptied without difficulty.



The hopper is designed for handling hot materials

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Suction Hose

United States Rubber Products Inc., 1790 Broadway, New York, has designed new blower and dust suction hoses. The dust hose is developed for either suction or light pressure, such as that generated by a blower. It is claimed to withstand the abrasive action set up in the conveyance by various abrasive types of particles. The carcass of the hose is supported by a steel wire helix and the thickness is dependent upon the abrasive nature of the material being conveyed. The hose is made in sizes of 2, 3, 4, 5, 6, 8, 10 and 12 inches.

Blower hose, for fumes only, is of lighter construction and ranges in sizes from 2 to 12 inches.

Crucible Furnace

A melting furnace in which the crucible is placed and from which it can be removed without the use of tongs, as shown in the accompanying illustration, has been developed by the Osborn Bronze Works, Clarksburg, W. Va. In addition to eliminating the hazard incident to the use of tongs, particularly on worn crucibles, it is claimed the method saves considerable time and energy, especially in handling large pots, whether shanked by hand or suspended by a bail from a crane or trolley.

Fig. 1 shows the furnace in melting position with shank in place under the hearth. Fig. 2 shows the furnace shell raised vertically 8 inches and then drawn back to clear the crucible. The bottom section of the furnace is made up of two semicircular parts mounted on hinges in such a manner that lifting the shank causes them to roll out of the way. An opening in the center fits closely around the pedestal on which the crucible rests. Construction of the furnace is cast iron throughout and for a No. 60 to 70 pot weighs 1200 pounds. The base is 52 inches in length and the total height 34 inches. It is claimed that the average melting time on a No. 60 to 70 pot of high bronze is 40 minutes and the maximum gas consumption 600 cubic feet per hour.

Disk Brake Motor

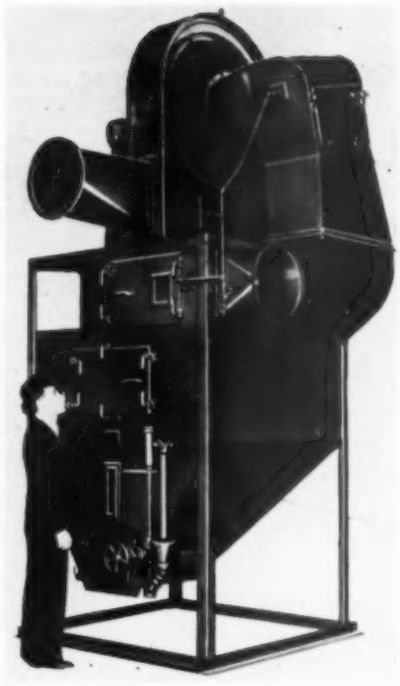
A power unit, known as a disk-brake motor, has been developed by the Reliance Electric & Engineering Co., 1088 Ivanhoe road, Cleveland. The motor combines in a single unit the functions of a motor with those of a powerful brake, and is used on small cranes, hoists, auxiliary movements on machine tools and other equipment in which quick, automatic and accurate stopping or holding of a load is necessary.

The brake itself consists of a simple, compact disk type friction device, mechanically and automatically engaged when the current is shut off and magnetically disengaged when current is applied. The friction lining is supported on a square steel hub which is keyed to the motor shaft. A wear indicator is combined with the manual brake release mechanism and gives warning whenever wear needs to be taken up.

Dust Separator

American Air Filter Co. Inc., Louisville, Ky., has developed a new type rotoclone in which the wetting effect of water is combined with the dynamic principle of dust separation to obtain increased collection efficiency with lighter and finer dust particles. It is claimed that the unit combines exhauster and dust collector in a single compact unit.

By introducing a water spray at the inlet, high collection efficiencies are said to be obtained with fine dust that can be wetted. The weighting of the dust particles with water



Wetting effect of water is combined with the dynamic principle of dust separation

spray and their impingement on the wetted surfaces of the impeller, makes it possible to separate and collect a wider range of particle sizes. The flowing film of water on all metal parts also is said to eliminate wear from abrasive dusts. The unit is designed to exhaust a constant air volume at all times.

The collected dust, discharged in the form of a light sludge into a settling tank, may be removed easily. A sludge ejector can be supplied which removes sludge continuously and automatically. For average application, the water consumption would not be more than 20 gallons per hour per thousand cubic feet per minute of air exhausted. The unit is manufactured in nine sizes with capacities from 700 to 30,000 cubic feet per minute.

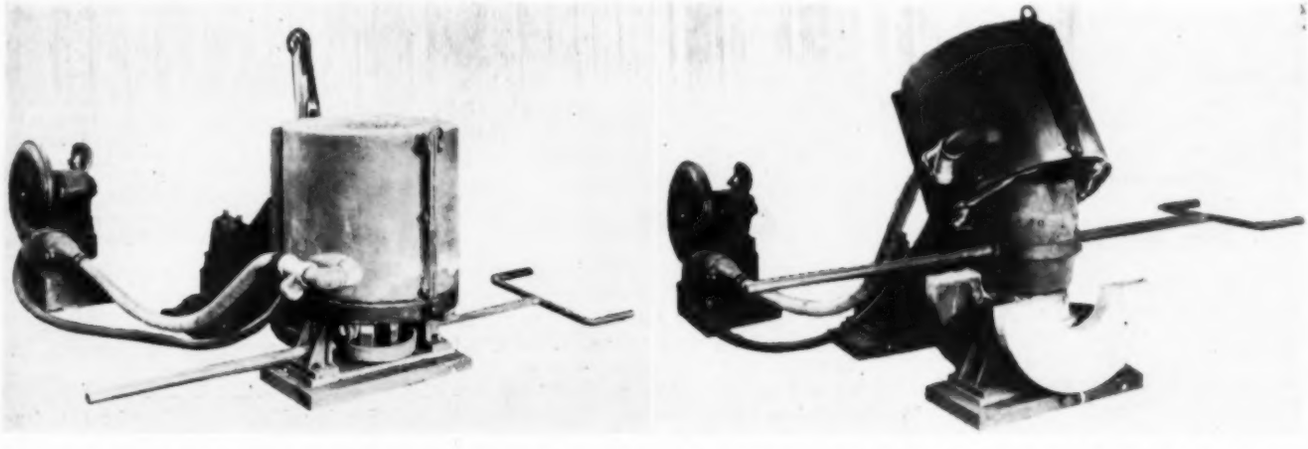
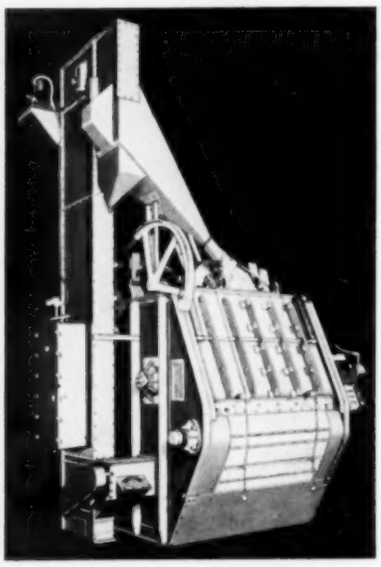


Fig. 1—Shows the furnace in closed or melting position. Fig. 2—The furnace shell is lifted and rolled back and the bottom sections rolled back on hinges to permit removal of the crucible

Blast Cleaning

A 48 x 48 inch wheelabrator tumblast unit recently has been introduced by the American Foundry



The unit will handle castings up to 300 pounds

Equipment Co., 555 South Byrkit street, Mishawaka, Ind. The unit is designed primarily for heavy-duty service in cleaning reasonably compact castings and forgings weighing up to 300 pounds. It has an operating load capacity of 20 cubic feet.

In this unit, a counter-balanced, power-driven door, opening and closing at the touch of an electric control button, is installed at a 65 degree angle to permit loading by a skip bucket loader or an overhead crane. An auxiliary hopper and screw conveyor, installed in a pit beneath the machine, reclaims abrasive which rebounds beyond the return abrasive conveying system.

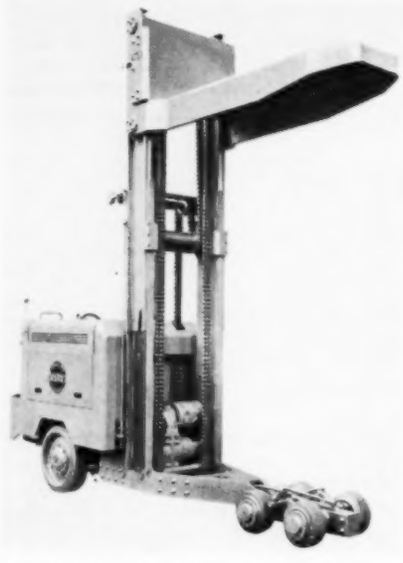
A suction type abrasive separator removes dust, broken down abrasive, burned molding sand, and other foreign particles. Controls are arranged so that the door cannot be opened while the machine is in operation and the loader cannot be raised to charging position nor the conveyor reversed for discharging the load while the door is in a closed position.

High Capacity

A new telescoping, high-lift truck of 5 tons capacity recently has been developed by the Baker-Raulang Co., Cleveland. The truck which is shown in the accompanying illustration, permits tiering skids to extreme heights while retaining a nested height low enough to enter a standard box car. The nested height is 88 inches and the maximum lift of the platform above the floor is 106 inches. Platform of the truck is 26½ inches wide, 54 inches long and 11 inches high in the lowered position, and dimensions may be varied to suit requirements within reasonable limits.

Hoisting of the platform is accomplished through 2 double, alloy steel, roller chains. The frame is steel plate, arc-welded and hot riveted. Upright members are heat treated alloy steel castings in channel form. Trailing axle is tandem type, articulated, and fully compensating in longitudinal and transverse directions. That axle with compensating suspension of the power axle permits travel over rough floors without transmission of road shocks, twisting of frame or danger of spilling the load.

Hoist controller operates through a magnetic blow-out, mill-type con-



High lift truck raises loads to 106 inches above the floor

tactor. The controller is connected to the hoisting mechanism in such a manner that it is returned automatically to neutral at the upper and lower limits of platform travel. The travel controller is arranged so that instantaneous reversals and starting from a dead-stop in the higher speeds is prevented.

Grab Bucket

Hayward Co., 50 Church street, New York, has developed a new grab bucket for handling bulk materials. The new model clam shell is built to a weight of just about a pound of bucket to a pound of material carried. Modern, light weight alloy construction makes possible the increase in capacity and at the same time gives increased strength.

Air Compressor

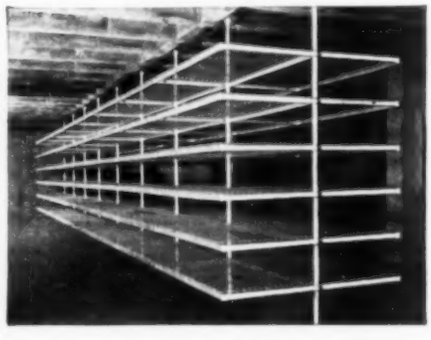
DeVilbiss Co., Toledo, O., has introduced a new line of air compressors available in 7½ or 10 horsepower with single or two-stage compressors available with either horsepower. The new compressing outfits are designed for industrial plants whose compressed air needs are not equal to the capacity of larger cooled types.

Two compressors, each developing a maximum pressure of 200 pounds with the two stage compressors, or 150 pounds with the single stage, are mounted on opposite ends of the 20 x 60 inch air tank. The motor driving both compressors is set between them on the tank. Each compressor has a V-belt drive, combination air strainer and muffler, check valve, inter and after cooler, and centrifugal pressure release mechanism set to cut in at 160 pounds and cut out at 200 pounds on the two-stage and in at 80 pounds and out at 100 pounds on the single stage compressor.

Storage Racks

Superior Wire & Iron Products, 1046 East Seventy-sixth street, Chicago, has developed a new storage rack which may be applied to foundries and pattern shops. Heavy wire mesh is so woven as to expose a flush working surface for stock handling ease. Construction gives ventilation, is claimed to prevent warping or moisture accumulation and allows no dust or dirt accumulation. The wire mesh also allows maximum sprinkler system operation and permits the filtering light through the complete structure for better working conditions. Shelves are adjustable to any position.

Racks may be obtained in any size and are standard equipment for



The storage rack is designed for use in the foundry or pattern shop

stationary, portable, or monorail installations.

Snyder Foundry Supply Co. has moved to its new office and warehouse at 2444 East 57th St., Los Angeles.

when using

MODERN SEALED HEAT APPARATUS

By retaining the heat in the metal you can pour extremely light work with large ladles. Each mold shown above takes fully 60 seconds to pour because of the peculiar gate construction. Yet the operator pours 10 molds without any sign of cold metal.

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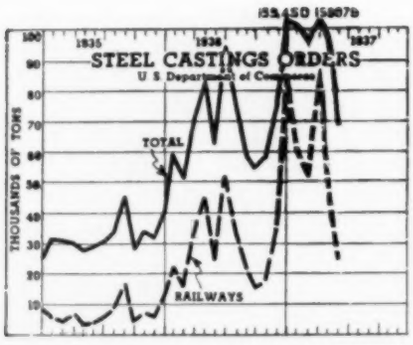
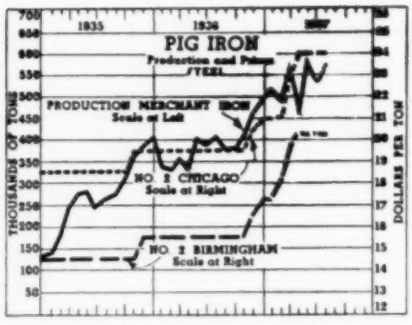
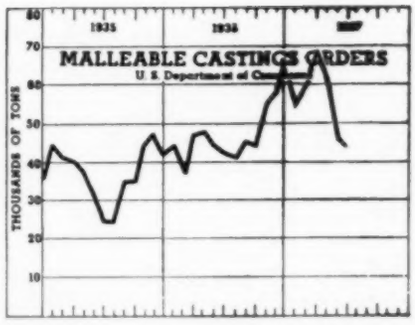






FOUNDRY ACTIVITIES

WESTINGHOUSE ELECTRIC & MFG. CO., East Springfield, Mass., will construct a monitor type steel and brick foundry, according to an announcement by L. E. Osborne, works manager of that plant. The new building will provide a floor space of about 45,000 square feet and will provide a 100 per cent increase in foundry operations. The new foundry is expected to be in operation by the end of the year.

* * *

Wheatley Bros. Inc., Tulsa, Okla., pump and valve manufacturers, plans expansion to its plant on recently acquired site. Frank Wheatley is president.

* * *

South Jersey Foundry Co., Vineland, N. J., recently has been formed with $125,000 capital stock. Harry Bastian is agent.

* * *

Brisk Foundry & Machine Co., 2434 National Bank building, Detroit, has been incorporated by J. S. Bratton Jr., Pleasant Ridge, Mich.

* * *

C. S. Humphrey Foundry Co., 418 Third avenue, Moline, Ill. recently has opened a pattern-making department to be operated in connection with the foundry. The company specializes in casting brass, bronze, aluminum, monel, nickel and nickel-silver and is equipped to make gray iron castings. Formerly a part of the Westco Pump Corp., the foundry now is run by Mr. Humphrey, Walter Crippen and William Watson.

* * *

Hines Mfg. Co., 10108 Detroit avenue, Cleveland, has moved its plant to 1324 Hird avenue, Lakewood, O., a suburb of Cleveland.

* * *

Lebanon Steel Foundry, Lebanon, Pa., is erecting a foundry building to cost approximately $50,000. J. H. Greinr & Co., Lebanon, has the general contract.

* * *

Minster Machine Co., Minster, O., is having a 48-foot extension built to its foundry department, which will be used for a cleaning room.

* * *

Erie Foundry Co., 1253 West Twelfth street, Erie, Pa., is building a core room and foundry to cost approximately $38,000.

* * *

Harrison Radiator Co., Lockport, N. Y., has awarded general contract for a $500,000 addition to its plant to Associated Contractors Inc. of Philadelphia.

* * *

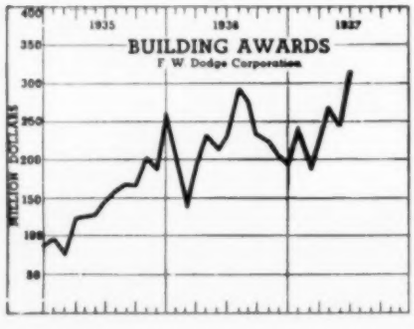
Mansfield Brass & Foundry Corp., Mansfield, O., recently was reorgan-

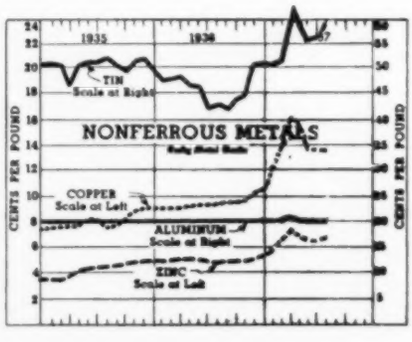
(*Continued on page* 100)

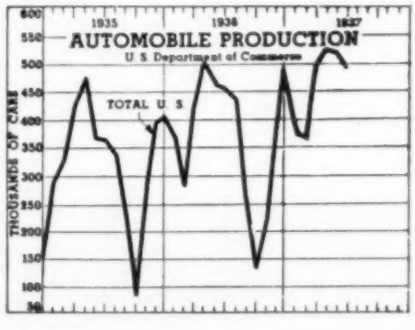
RAW MATERIAL PRICES

August 4, 1937

Iron	
No. 2 foundry, Valley	$24.00
No. 2 Southern Birmingham	20.38
No. 2 foundry, Chicago	24.00
No. 2 foundry, Buffalo	24.00
Basic, Buffalo	23.00
Basic, Valley	23.50
Malleable, Chicago	24.00
Malleable, Buffalo	24.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$ 6.00 to $ 6.50
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.10
Scrap	
Heavy melting steel, Valley	$18.50 to $19.00
Heavy melting steel, Pitts. (Ilv.)	21.00 to 21.50
Heavy melting steel, Chicago	17.50 to 18.00
Stove plate, Buffalo	15.00 to 16.00
Stove plate, Chicago	11.00 to 11.50
No. 1 cast, New York	15.50 to 16.00
No. 1 cast, mchy., Chicago	16.50 to 17.00
No. 1 cast, Pittsburgh	20.00 to 20.50
No. 1 cast, Philadelphia	20.50 to 21.00
No. 1 cast, Birmingham	15.50 to 16.00
Car wheels, iron, Pittsburgh	21.00 to 21.50
Car wheels, iron, Chicago	20.50 to 21.00
Railroad malleable, Chicago	21.50 to 22.00
Malleable, Buffalo	20.00 to 21.00
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	13.75
Straights tin	58.87½
Aluminum, 99 per cent	20.00
Aluminum, No. 12 (Secondary, standard)	18.50 to 19.00
Lead, New York	6.00
Antimony, New York	15.37½
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	7.00







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2145 W. Walnut St., Chicago, Ill.

Please send me tentative program on industrial advertising and sales promotion of N. I. A. A. meeting ☐ I am going —please register my name ☐

*Name*_____

*Company*_____

*Address*_____

(*Continued from page* 100)

ized and recapitalized. The foundry, which has operated in Mansfield for more than half a century, is one of the pioneer industries of that city. John H. Berry is president, Charles H. Berry, vice president; and Glenn L. Bierly, secretary and general manager.

* * *

Urick Foundry Co., Erie, Pa., recently added to its operating capacity and now can melt 500 tons of gray iron castings per month. New equipment recently installed includes two cranes, weight control cupola blower, mold drying oven, and conveyor equipment. R. W. Britton and E. J. Hedlund are owners of the company.

* * *

Griffin Wheel Co., St. Paul, will enlarge and remodel its factory at an approximate cost of $30,000. General contract has been awarded to William Baumeister Construction Co., Pioneer building.

* * *

Aluminum Co. of Canada Ltd., 158 Sterling road, Toronto, Ont., Canada, plans to construct a $40,000 plant on Perth avenue.

* * *

Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., is planning construction of a new building 100 x 520 feet as an addition to the finishing department, according to David O. Thomas, general manager. General contract has been awarded to the Austin Co. in Detroit.

* * *

Elyria Foundry Co., Elyria, O., a subsidiary of Industrial Brownhoist Corp., Bay City, Mich., will build a 3-story, 90 x 175 foot foundry addition to cost about $45,000.

* * *

Aetna Foundry Co., Charleston, W. Va., with a capitalization of $50,000 recently was incorporated to make high test cast iron castings for use in the Kanawha Valley's chemical industry. Incorporators include Homer P. Elliott, Homer P. Elliott Jr., and Robert B. Cassady. The works will be located at Vandalia.

* * *

Rundle Mfg. Co., 3305 West Forest Home avenue, Milwaukee, will build a foundry addition to be 65 x 90 feet. Klug & Smith Co. has been awarded general contract.

* * *

Lewis Foundry & Machine Co., Pittsburgh, subsidiary of the Blaw-Knox Co., has enlarged its manufacturing facilities and increased its total floor space approximately 50 per cent.

* * *

Richards Foundry Corp., Mount Vernon, N. Y., recently has been incorporated by Cavanaugh & Konrad, Mount Vernon Trust Co., Bldg., Mount Vernon.

* * *

Faultless Range & Mfg. Co., New York, transferred its operations to the plant of the Mt. Penn Stove Works, Reading, Pa. The Mt. Penn company will provide the castings for the Faultless company.

* * *

Rising Manufacturing Co., has been issued a certificate to conduct business under a firm name operating a foundry and machine shop at 1843 West Gage street, Los Angeles, and owned by H. G. Rising, of 1128 West Thirty-ninth street, Los Angeles.

* * *

Index of foundry equipment orders for June, according to a report of the Foundry Equipment Manufacturers' association, Cleveland, was 228.2 as compared with 237.6 for May and 141.4 for June, 1936. Index of shipments was 232.1 as compared with 226.2 in May and 153.0 for June of the previous year.

* * *

Wisconsin Grey Iron Foundry Co., 7225 West Main street, Wauwatosa, Wis., suburb of Milwaukee, has purchased the casting plant of the former National Brake & Electric Co. at the foot of Belleview place,

(*Concluded on page* 102)

D. S. M.
CORE BAKING OVENS

Selecting the right type of baking oven should of course be determined largely by your conveying or handling problem.

The conveyor and coremakers shown above are directly under a three pass horizontal continuous D.S.M. oven, 165 ft. long, in a large automotive foundry in Flint.

The monorail conveyor is loaded as it travels past the coremakers who are working at both sides of the conveyor. This oven is baking the output of between 30 and 40 coremakers. The product is uniform, whether loaded on the top tray or the bottom one. Small pin cores weighing about ten to the pound are baked on the same carriers which convey ten or twelve pound cores—and without burning or over baking. This is a result of proper air conditioning.

We advocate vertical ovens wherever practicable. But for certain core room layouts the overhead horizontal oven fits better.

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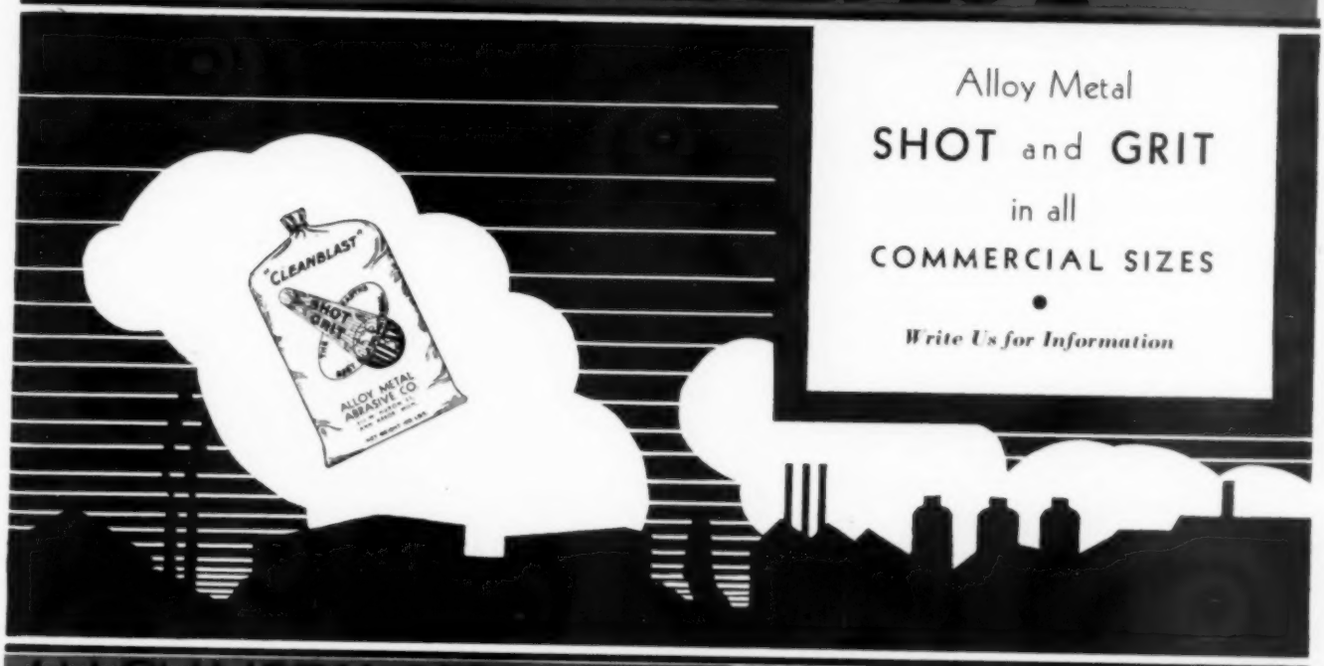

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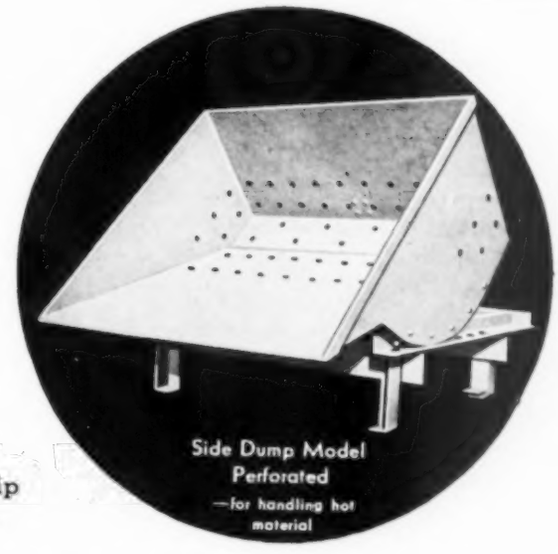
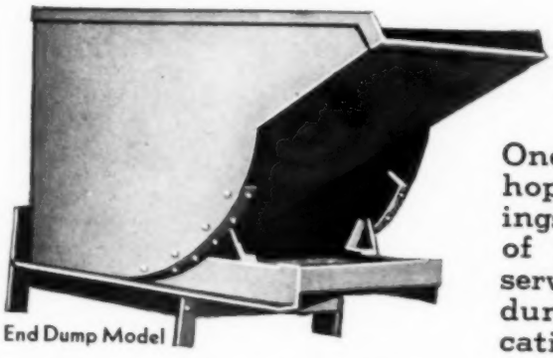
ROURA

Dump Hoppers

Side or End Dump




End Dump Model

—with finger-tip balance

One-yard, positive locking, easy tilting, dump hoppers for handling foundry materials, castings, sprues and scrap. They extend the use of your lift trucks. Built for hard, long service. With or without casters, side or end dump, solid or perforated. Write for specifications and prices.

ROURA IRON WORKS, 1403 Woodland Ave., Detroit, Mich.

(*Concluded from page* 100)

Milwaukee, from the Westinghouse Air Brake Co. About $20,000 will be spent on the foundry for modernization purposes. John E. Burke is president. H. P. Andrae, vice president, Mackey Wells, treasurer; Leo Mullaney, secretary, and Arthur C. Haack, assistant secretary.

* * *

Burden Iron Co., Troy, N. Y. has reopened its gray iron foundry. C. P. Franchot, vice president, stated that the addition of gray iron castings to the company's products is an initial step in the program of expansion and rehabilitation.

NEW TRADE PUBLICATIONS

Copies of any of the literature listed below may be obtained by writing directly to the companies involved, or by addressing THE FOUNDRY, in care of Readers' Service Department, 1213 West Third Street, Cleveland

MOLDING MACHINES—International Molding Machine Co., 2608-2624, West Sixteenth street, Chicago, has presented in a recent publication a series of foundry views illustrating its line of molding machines.

OXYGEN LANCE—Linde Air Products Co., 30 East Forty-second street, New York, describes the oxygen lance, how it is used and what it will do, in a recent publication.

REFRACTORIES—Ironton Fire Brick Co., Ironton, O., has issued three small booklets on ladle pouring brick, ladle bottom tile and cupola blocks. Description is given of installation, construction and use of each.

SWITCHBOARDS — General Electric Co., Schenectady, N. Y., has published a bulletin on its streamlined switchboards, featuring the fact that all devices are placed on the boards in a semiflush manner. Illustrations point out accessibility of this type, neatness, wiring, etc.

CUPOLA BLOWING — Ingersoll-Rand Co., 11 Broadway, New York, has issued a bulletin on its blower for cupolas, with constant air-weight control. How this automatic control works, operation of the unit, its construction and an article on modern theory and practice in cupola operation are included.

ARC WELDING—Hobart Bros. Co., Troy, O., has issued a catalog on its 40 volt simplified electric arc welder. The publication contains illustrations of the various jobs the welder can handle as well as a complete description of the line.

SCREWS—Farrell-Cheek Steel Co., Sandusky, O., has published a bulletin on its line of stoker and conveyor screws. These are produced from a special wear-resisting screw steel in sizes to meet individual needs. Illustrations point out construction details.

LUBRICATION—Alemite division of Stewart-Warner Corp., 1826 Diversey parkway, Chicago, has published its 1937 industrial catalog, "Alemite Controlled Lubrication." The entire ringe of the company's industrial equipped is presented in the 56 pages.

CONVEYING SYSTEMS—Louden Machinery Co., Fairfield, Iowa, has issued an attractive well illustrated bulletin covering its one-piece section for a hand-operated monorail system. Details of including description of switches, curves, steel framing, etc.

PATTERN LUMBER — Treat-Nantke Co. Inc., River road, Tonawanda, N. Y., has issued a folder on its facilities for the drying, storage and handling of pattern, flask and template lumber. Illustrations show lumber sheds, railroad proximity and offices.

HEATING ELEMENTS—Surface Combustion Corp., Toledo, O., has issued a folder descriptive of its horizontal, gas-fired radiant tube heating elements as applied to phases of heat treating. A gas atmosphere preparation unit also is shown.

HAND TRUCKS—Six different types of hand trucks are illustrated and described in a folder distributed by the Sabin Machine Co., 6536 Carnegie avenue, Cleveland. Capacity, truck width, axle and wheel measurements, and load limit are given in each case.

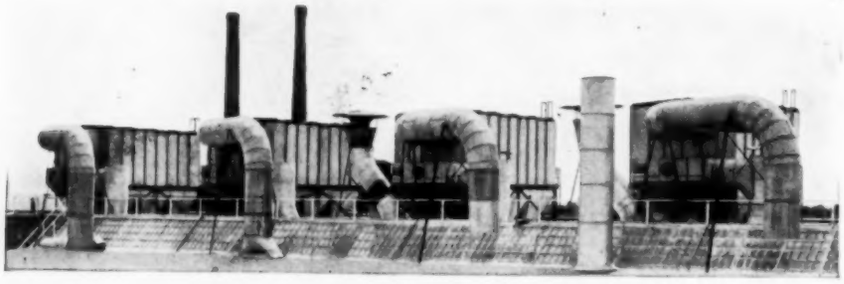
MOISTURE TELLER—Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has issued a pamphlet describing sand testing equipment and its applications

(*Concluded on page* 104)

ONE MAN can EASILY REPLACE BAGS in DRACCO DUST COLLECTORS

DRACCO Multi-Bag Filters are very ECONOMICAL to operate, and the cost of maintenance is reduced to a MINIMUM. ONE man can EASILY replace filter bags from the passageway. Remember,—it is NEVER necessary to enter the dirty air side of DRACCO Filters. With 20 years experience to draw upon DRACCO Engineers are qualified to offer you sound advice in solving your Dust problem. You are requested to write.

Get Bulletin No. 302



4 DRACCO Dust Collectors

DRACCO FILTERS are Maintained on the CLEAN AIR SIDE

WORKED ON DIRTY AIR SIDE • WORKED ON CLEAN AIR SIDE

• *Write for Bulletin No. 302* •

DRACCO CORPORATION

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$1100 MONTHLY SAVING on COKE

Here is a typical example of the substantial COKE savings made by the Balanced Blast System.

This 72″ Cupola formerly melted 19 tons of grey iron per hour on a coke ratio of 1:10. After being converted to a 66″ Balanced Blast, it melts 21 tons per hour on a coke ratio of 1:15, with the same spout temperature of 2660 Farh., with average monthly coke savings of $1,100.

Scientific control of the distribution and measure of the blast makes possible this reduction in melting costs . . a saving that quickly pays for the installation. The Balanced Blast System is applicable to any Cupola, old or new, for grey iron or cupola malleable. Let us tell you how it will reduce your melting costs!

The Balanced Blast Cupola was developed and perfected by the British Cast Iron Research Association. Protected by British patents, U. S. A. patents and patents in Foreign Countries.

√ *Reduces coke consumption from 20% to 40%*

√ *Iron free from oxidation*

√ *Reduction in scrap and defective castings as result of freedom from oxidation and higher temperatures*

Balanced Blast CUPOLA

McWANE CAST IRON PIPE CO., *FOUNDRY ENGINEERING DIVISION*
Licensee for U. S. A. BIRMINGHAM, ALA.

MELTING IRON IN THE CUPOLA

By J. E. Hurst

This book covers practically every phase of cupola construction, operation and maintenance. It is written and illustrated in a manner that will appeal to every foundryman whose work from any angle brings him into contact with the oldest, most convenient and most economical device known for melting iron in the foundry.

240 pages, 6 x 9
126 Illustrations

Cross index listing over 1,000 items

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Book Department
1213 W. 3rd St. - - Cleveland, Ohio

332-F

(*Concluded from page* 102)

on various materials. Specifications and test methods for moisture determinations are given.

WATER SYSTEMS—Roots-Connersville Blower Corp., Connersville, Ind., has incorporated information into a booklet on its line of shallow well water systems. Three styles are covered by the bulletin, built in two sizes, 300 and 500 gallons per hour respectively.

WOVEN WIRE SCREENS—W. S. Tyler Co., Cleveland, has recently published specification tables on woven wire screens into booklet form. A special index is included. Steel space and wire cloth, phosphor bronze, brass and copper space cloth are fully covered.

ATLANTA, GA.—Industrial bureau, chamber of commerce, Atlanta, has compiled an unusual booklet called "Facts and Figures About Atlanta." Population, distances from other cities, aviation data, communication facilities, transportation, etc., are a few of the interesting subjects treated.

MOLDING MACHINES — Champion Foundry & Machine Co., 3018 West Twenty-first place, Chicago, has developed a reference catalog on its line of molding machines and foundry equipment. Its electric riddle also is described. Brief information is included with each of the numerous illustrations.

CUPOLA CONTROL—Edwin S. Carman Inc., Lee road at Mayfield, Cleveland, has published a leaflet entitled "The Trend of the Times" which illustrates by a background chart the difference in the amount of air that was required for correct melting conditions over a period of eleven weeks.

REFRACTORIES—A booklet on silicon carbide refractories for brass melting furnaces has been published by the Fisher Furnace Co., 1816 North Lamon street, Chicago. A complete price list is included. Silicon carbide furnace covers and crucible rests are described. Dimensions and capacities for crucibles produced by the company also are given.

PUMPS—Fairbanks, Morse & Co., 900 South Wabash avenue, Chicago, has prepared three bulletins. The first describes its line of ball bearing centrifugal pumps; the second its centrifugal pumps designed specifically for fire use; and the third, its self-oiling power pumps for water, oil and similar liquids at pressures up to 300 pounds per square inch.

ELECTRIC METERS—Brown Instrument Co., Philadelphia, has prepared an illustrative catalog of its electric carbon dioxide meters for indicating and recording. How waste occurs in combustion, application of the thermal-conductivity principle to carbon dioxide measurement and operating advantages of the company's meters are outlined in detail.

MINING PROPERTIES—West Virginia Coal & Coke Corp., Atlas Bank building, Cincinnati, O., has republished a story of the company's 7 miles of mining properties through southern West Virginia. History of the company, management, mining methods, transportation, safety, ventilation, etc., are compiled in a manner which makes interesting reading.

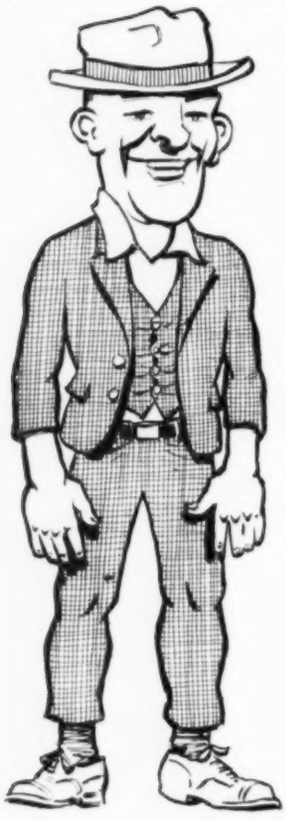
BELT CONVEYORS—Chain Belt Co., 1600 West Bruce street, Milwaukee, has prepared an equipment and engineering data book and catalog for the convenience of the belt conveyor user and the designing engineer. It contains complete information on design and application of belt conveyors for handling bulk materials, together with full listing of the company's equipment.

MONEL AND NICKEL—Development and research division of the International Nickel Co. Inc., 67 Wall street, New York, has compiled technical information on the machining of monel, nickel and nickel alloys. Written by W. F. Burchfield, the bulletin treats comprehensively such subjects as stock for machining; tool design; cutting compounds; cutting-off operations; and reaming.

FOUNDRY EQUIPMENT — Whiting Corp., Harvey, Ill., has published a bulletin No. 218 entitled "Pointing the Way to Lower Foundry Costs," which includes illustrations and information on its cupolas, hot blast system, mechanical charging and materials handling equipment, the Brackelsberg furnace, air and cradle furnaces, converters, stokers, tumbling mills and dust filters.

SPECTROMETRIC EQUIPMENT — Bausch & Lomb Optical Co., Rochester, N. Y., has cataloged information on its spectrometric equipment recently. Basic theory and design are discussed in the introduction, a laboratory wavelength spectrometer and a large constant deviation spectrometer with wave length scale are described, and the booklet concludes with a complete section on equipment for spectrophotometry.

PYROMETERS—C. J. Tagliabue Mfg. Co., Park and Nostrand avenues, Brooklyn, N. Y., outlines features of its line of recording potentiometers, pyrometers, recorder-controllers, etc., in a recent catalog. Illustrations show details of construction and temperature instruments in operation. Specifications of the units, their accessories, and various charts for recorders and recorder-controllers complete the publication.



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